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In Memoriam
Professor Edgar C. Polomé, died March 11 2000, aged 79

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St. Alban and the End of Roman Britain

Philip Thornhill[1]
Clapton, London

The following is the first of a series of articles seeking to explain the sub-Roman cult of St. Alban in terms of the syncretic adapatation of pagan traditions, associated both with 'Albion' as the earliest recorded name for Britain and divine names in 'Albio-' or 'Alb-' from a broad swathe of the Indo-European languages. It suggests the cult was in some sense a response to political pressures, associated both with the aspirations of Verulamium to a pan-British dominance, and, allied to that, the fostering of a pan-British identity. As well as antecedents from the Indo-European tradition, derivatives of our cult-figure are identified in the medieval Celtic tradition (especially 'Elen of the hosts', Part II), suggestive of a likely role for the cult in the sub-Roman period as a focus for unity amongst the Britons in their struggles with invaders. In Part III, parallel cults (especially St. Alban of Mainz) from the continent are explored while part IV seeks to analyse the etymon 'albho-' in terms of 'al-' plus '-bho-', thus helping to explain the conflation in an early medieval cult context of 'elv-' from 'albio-' with 'el-' from 'al-'. On this basis saints and heroes in 'El-' are interpreted as derivative, or at least influenced by, the cult of St. Alban and its likely role in the sub-Roman period (Part V). Part VI examines the implications of this hypothesis about the cult for sub-Roman history, together with other evidence for the achievement of, or aspirations towards, some degree of political unity by the Britons of that period.

Part 1
The Sub-Roman Cult of St. Alban

The cult of St. Alban is the earliest recorded cult of a Christian saint in Britain, and he is one out of only three recorded British martyrs from the Roman era. His martyrdom would seem to constitute one of the very few facts that we have about Christianity in Britain during the Roman period, while the existence of his cult is

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one of the few things we know about Christianity - or anything else - in Britain of the immediately post-Roman period. The earliest record of his cult comes from Constantius's Life (Levison 1920) of St. Germanus of about 480, but this suggests the cult was well established, by at least 429. The earliest native record comes in the *De Excidio* of Gildas (Winterbottom 1978) from probably the second quarter of the sixth century while the earliest Passio from Gaul seems to date back to the early sixth century (Meyer 1904). Arguably, the one most significant fact that we have about this cult is that it was associated with the city of Verulamium, (on the edge of the modern St. Albans). Gildas is the first to supply us with this information directly but the Continental Passios seem to show knowledge of local Verulamium topography (Levison 1941: 347) and so reinforce the martyr's link with this place.

It is this fact, anyway, that we will focus on here. The way that the cult of St. Alban figures so uniquely in our early sources is clearly not fortuitous but reflects the importance of the cult at the time. We might ask whether the association of such a cult with the city of Verulamium is likely to have been rather less than purely fortuitous, also. The old 'capital' of the province, or vicariate, of 'Britannia' was, of course, London, and it might not be unreasonable to expect something of that status to have been carried over into the immediate 'post-Roman' period. However there are quite good reasons why London might have lost its dominance subsequent to the Roman withdrawal, too. London had originally been highly dependant for its importance and success on trade and other links with the continental Empire, although as these declined during the later Roman period it will probably have become more and more dependant on the actual presence of the Roman military and administrative elite. Obviously the latter will have disappeared in 409 while there is not likely to have been very much of the former, subsequent to that date, either. Verulamium, by contrast with London, had its roots deep in the pre-Roman past, having been a major centre of the dominant British 'tribe' of the pre-Roman era, the 'Catuvellauni'. Their royal mint had been at 'Verlamion' before Colchester, or 'Camulodunum', became their 'capital' as a result of their conquest of the Trinovantes (Salway: 36, 47, 55-7). Subsequently, Verulamium will have been conveniently situated close to the administrative and commercial centre of the province and seems a likely base for the

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most powerful elements of the native British aristocracy, during the Roman period: while in the post-Roman period it would have been very well placed, geographically, to succeed to the role previously played by London. It would have been, perhaps, the most likely city in Britain to aspire to any kind of 'pan-British' dominance subsequent to the ejection of the last Roman administration from the island. As far as it goes the archaeology of Verulamium would seem to be compatible with this idea in so far as it seems to confirm that its fortunes were at least 'above average' in the post-Roman period (Cleary: 148-51; Frere: 1983), while it has long been suspected that it was part of an enclave that resisted Anglo-Saxon domination, or at least excluded Anglo-Saxon settlement, for longer than most of Eastern Britain (Wheeler 1935; Dark: 86-9).

It seems unlikely, therefore, that what was almost certainly the most important cult of post-Roman Britain, the one that attracted the special attention of Bishop Germanus, was located at this place by pure coincidence. The importance, and apparent dominance, of the cult, then, looks likely to have been a factor of the importance - and perhaps dominance - of Verulamium, itself, in the immediate post-Roman period.

In fact we might go even further and suggest that the very existence of a martyr's cult here might have had more to do with the aspirations to political dominance of this important city than any genuine tradition from the pre-Constantinian era. It is true that Gildas presents a picture of numerous British martyrs, even if he names only three, but there are good reasons to suspect that this picture is not based on any genuine historical information from the era of the persecutions (cf. below with note 3). Rather, his mention of "their graves and the places where they suffered" suggests it was based on the existence of a large number of martyrs' cults in his own time, or in the relatively recent past before the Anglo-Saxon take-over of much of the Eastern part of the island. Analogy from Gaul, as well as the rather meagre record in Britain of pre-Constantinian British Christianity (Griffe: 130-3; Thomas: 44), would suggest that there were likely to have been rather few genuine British martyrs, while analogy from the rest of the one-time Empire, in general, would suggest that there were abundant means of 'manufacturing' bogus martyrs where, as it were, demand outstripped supply (Jones: 958; Delehaye 1933: 88-9; *Vita Martini* XI; Thornhill:

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469-70). The 'martyr' was the most characteristic 'cult-figure' of early Christianity and Britain will have inherited, and conformed to, this tradition, even if that meant that (by no means exceptionally) martyrs had to be rather artificially 'created'. No doubt the question merits fuller discussion but if we suspect that many of the martyrs of sub-Roman Britain were actually bogus then that must cast a doubt on the one of Verulamium especially when the existence of this cult looks suspiciously convenient in terms of the way it is likely to have worked in favour of that city's political aspirations.

The inevitable power vacuum after 409 would seem likely to have meant that there was even more likelihood of religion playing a key role in political developments than was the case elsewhere in the Empire where the secular, Roman state and its traditional power structures survived much longer. It seems very likely, for instance, that the dispute over 'Pelagianism', had an important political, as well as purely doctrinal, side to it, although this is unlikely to have become an issue until subsequent to 418 when the doctrines of Pelagius and Coelestinus were stigmatized as 'heretical' at Rome. We would have to guess that there were chaotic and quite drastic political developments in the immediate aftermath of 409, involving the efforts of the elite, or competing factions within it, to maintain their hold on power. We do not know when the cult of St. Alban rose to prominence but it may well have been at this stage. If so there is every chance that the cult was not only closely associated with the political aspirations of the ruling elite of Verulamium but also that it owed its very existence to those aspirations: that it was in some sense a response to political pressure - in a time of great political instability, if not chaos and upheaval.

There is nothing in the accounts of Alban's martyrdom that would conflict with the idea that his cult was a rather artificial creation: the Passio of St. Alban contains nothing more than borrowings from, and the familiar commonplaces of, the Passios of the period, plus some topographical knowledge of Verulamium[2]. Gildas, meanwhile, seems unlikely to have based his reference to the martyr on any other more accurate source of historical information given the fact that he had to

[2] Levison 1941: 344-9, especially 346: "....no place in the rank of Acta martyrum sincera; it is a legendary tale..."

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make a guess about the date of the martyrs' death - a guess, moreover, that is now generally considered to be a wrong one[3].

If, then, we are to accept for a moment, that St. Alban was, as it were, a 'fake', then we are left with the question: where, in this case, does the actual name, 'Alban', come from? One possibility might be that it was read from a tombstone of someone (wrongly) assumed to be a martyr. This sort of thing is suggested by parallels from elsewhere within the Christian world (Delehaye 1933: 88-9). On the other hand we might suspect that there is something rather significant about the name 'Alban', itself, because it contains *albus*, the Latin for 'white', so that it could have been chosen especially, because it implied the spotless purity appropriate to a saint or martyr. But there is something even more suspiciously 'appropriate' to the name Alban. It bears an uncanny resemblance to the oldest known name for the island of Britain: 'Albion'. This was the form used by Pliny, and as a name for the people of Britain ('insula Albionum': 'the island of the Albiones', in our late Latin version) it is found in a work that goes back to Ephorus of Massilia of the mid fourth century B.C.[4] It continued in use, amongst the Irish, into mediaeval times and beyond, in the form 'Alba' or 'Albu', earlier 'Albe' or 'Alpe' (Watson: 10-13; O'Rahilly: 385-7; *DIL*: 284). The similarity with this name is all the more striking, given the rather special nature of the cult of St. Alban, which, at this early period, seems to have been, to a remarkable degree, not just 'a', but very much 'the' Christian cult of Britain. It is, for instance, the one cult that Germanus is recorded (*Vita Germani* XVI) as having made a special effort to pay his respects to:

> When this damnable heresy had thus been stamped out, its authors refuted, and the minds of all re-established in the true faith, the bishops (Germanus and Lupus) visited the shrine of the blessed

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[3] Levison 1941: 344; Thomas: 48. Gildas attributed the martyrdom to the persecution of Diocletian but this did not extend to Britain according to Eusebius, *Historia Ecclesiastica* VIII. 13 and Lactantius, *De Morte Persecutorum* XV.

[4] The *Ora Maritima* of Avienus (in Berthelot 1934, ll. 94-134; trans. In Rivet: 54-5).,of the 4th c. A.D., based ultimately on that of Ephorus of Massilia (4th c. B.C.) who used a 6th c. 'periplus' but the reference to 'insula Abionum' (for Britain), probably did not come from that: Hawkes: 17-25. Other records of the name (from the 1st c. A.D.: Αλβιων, Αλουιων) are in Rivet: 39, 247-8.

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martyr Alban, to give thanks to God through him.

We might doubt whether Germanus's victory was as complete as it appears here, but not that he made this important visit, which here seems to symbolise the success that Constantius claims for his hero, as if the martyr Alban had the power to represent the whole of British Christianity, now brought safely within the fold of continental orthodoxy. Perhaps even more striking is the fact that it is St. Alban who is regarded as responsible for the safe passage of the bishops back to Gaul (*Vita Germani* XVIII):

> Their own merits and the intercession of Alban the Martyr secured for them a calm voyage; and a good ship brought them back in peace to their expectant people.

It seems as though the martyr's sphere of influence extends to the sea around, and by implication the whole of, the island of Britain. At any rate the significance of the martyr, for Constantius, seems to go beyond the mere fact that Germanus visited his tomb.

The pre-occupation of Germanus with the cult of St. Alban is reinforced by the Continental Passio of the latter. The fact that this refers to the visit of Germanus (Meyer: 44-5 : Turin text l. 139, Paris text l.121), and that it seems to contain local topographical knowledge of Verulamium, with the added possibility that it has an 'anti-Pelagian' doctrinal slant (Levison 1941: 347; Wood: 13-14), all suggest that the original version[5] of this came from Auxerre and quite likely from the circle of Germanus, himself. Interestingly, it, too, associates St. Alban with Germanus's sea voyage - this time to, rather than from, Britain:

> Ipse se in itenire ostendit. etiam supra saltebus maris referente sancto germano.

The martyr appears again to Germanus in his 'basilica' where he

[5] That the Turin text, as we have it, is not the original is suggested by the fact that the other (later) texts preserve at least one element of an older version: referring to an 'iudex' rather than the 'Emperor Severus': Levison 1941: 349-50, Wood: 13.

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reveals to him the story of his persecution.[6] Finally, Germanus's desire to associate Albanus with continental orthodoxy is made all the more clear: he places relics of continental saints in his tomb, while taking some dust from the same back to Auxerre (Turin text ll. 148-52). St. Alban now belongs to the community of Christian saints: he does not stand alone (cf. Wood: 12). Finally there is Venantius Fortunatus, in his late sixth century poem 'On Virginity' (e.g. Thomas: 49): "Fertile Britain brings forth illustrious Alban" where Alban appears again as the 'archetypal' British saint and, arguably, comes close to being perceived as the Christian patron of the island as a whole.

'Albanus', of course, is not 'Albionus': it does not contain the root *albio* that is present in 'insula ALBIOnum'. It is based on the Latin word *albus* and is, in fact, quite a common Latin name. However, this in itself might have rendered it innocuous and acceptable to conventional 'mainstream' Christians. On the assumption that this name did not belong to an actual martyred citizen of Verulamium we might be dealing with an acceptable Latinization of, or Latin equivalent for, a native name that had powerful associations in native legend, myth and probably religion. This would have allowed the figure so named to be understood in different ways by different people in a society where two languages were commonly spoken and where the cultural gap between the Romanised elite and the native masses was a wide one to bridge. And it may have been a time when it had become especially necessary to bridge that gap, since it was no longer possible for the elite, or any faction thereof, to rely on external 'Roman-Imperial' support, to maintain its position amongst the native populace.

But if the old name for Britain was really involved here there is more, too, since it would be hard to avoid the conclusion that this cult was linked to the aspirations of Verulamium, or of elements of the British elite mainly based there, to aspire to some kind of

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[6] Meyer: 44, Turin text ll.142-8 : apparently an early addition to the original text (Levison: 348). The fact that Germanus, alone, was regarded as having been miraculously transmitted the martyr's story might imply that in actual fact he was responsible for the (standardised version of ?) the saint's Acta (with its anti-Pelagian slant ?). Cf. his role in regularising the feast date of St Julian of Brioude: Thornhill: 471-2. It is even possible he introduced the cult: see below.

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pan-British hegemony, and, parallel to that, to encourage some kind of regional pan-British consciousness. It would look very likely that the 'martyr', Alban had been more or less purpose-designed as a kind of 'genius' of the island, or one-time province, of Britain, to perform the kind of function that previously many a pagan god had done - as especially identified with one or another 'city-state', region or tribe. So that Alban would have been to 'Albion', something approaching what, for instance, 'Athene' had been to Athens or 'Brigantia' to the 'Brigantes'. This kind of function can certainly be seen to have been filled by Christian cult figures – 'saints' or 'martyrs' – in other contexts (if not actually with this kind of correspondence between saint's name and name of political entity). It is true that it is difficult to be sure about precisely what associations the old name for Britain - at that time certainly current in literary circles and closely matched by the form used by the Goidelic speakers of Ireland - will have had for an early fifth century Briton but it must be possible that its very antiquity will have lent it a certain powerful mystique, while, as suggested above, it may have had any number of associations in native legend and myth. In fact the name has been interpreted as containing that of a pagan cult-figure, as we will see below, and may always have had some religious significance, so that, to that extent, our cult need not have been entirely new and 'artificial'.

In considering the possible pagan associations of our cult we should bear in mind that although Christianity clearly remained dominant in fifth century Britain (outside the areas conquered by the Saxons), and even expanded beyond the old Roman province (*Confessio* of St. Patrick; Bede, *Historia Ecclesiastica* III.4), nevertheless the archaeological evidence suggests that traditional Romano-Celtic paganism remained strong to the end of the fourth century, at least (Higham: 65; Salway: 734). Christianity will have been disseminated, chiefly, from the top downwards due to the effects of Imperial patronage and will have been a feature, above all, of the elite (certainly of what turned out to be the dominant element within it). As we have suggested above it may well be that after the removal of Imperial support, competing factions within the Christian elite will have felt the need to appeal for the support of the masses - who, even if nominally Christian, will probably have preserved a pagan 'mentality'. This will have provided the context for the kind of

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syncretism we are suggesting.

As regards the notion of a regional 'British' consciousness at this period we can bear in mind the oft-quoted the passage (VI.5, in e.g. Salway: 434) of Zosimus (writing c. 498 A.D.) that shows that the Britons were not just 'abandoned' by the Romans but rather took matters into their own hands to repel barbarian intruders and rise up in rebellion against the last Roman administration. This revolt can be interpreted as 'loyalist' insofar as it was against the regime of an illegitimate usurper, but it is important that 'the people of Britain' were able to effectively shape their own collective destiny at this time. Another factor to bear in mind is that although the debate over 'Pelagianism' undoubtedly had its roots in a genuine doctrinal schism just as African Donatism had, nevertheless, like Donatism, and also perhaps, Monophysitism at a later date, it may well have become closely associated with regional identity and resistance to centralised imperial control. Pelagianism will only have became controversial as a result of Continental developments so that, from the start, pro- and anti- Pelagians will have represented those reacting against, or conforming to, a new Continental 'orthodoxy' (Markus 1986) and the evident persistence of what was now a 'heresy', in Britain, may be another sign of the willingness of some Britons to express a separate, distinctive, 'British', identity. There have been credible enough speculations about a 'Pelagian' and anti-Imperial party, matched against an 'Orthodox' and pro-Empire one[7]. Germanus, anyway, was surely concerned to ensure that the political divergence of Britain from the rest of the Empire was not matched by religious divergence, as well. It is just possible that Germanus actually instigated the cult of St. Alban, himself, as a focus of British regional sentiment firmly aligned with orthodoxy, to counter-balance any analogous appeal that Pelagianism may have had[8] : if so he will surely have allied himself with the ruling elite at Verulamium in order to achieve this, and it remains significant that he chose this city as the centre for the cult.

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[7] Though it is too optimistic to suggest we can identify the protagonists, as in the Vortigern versus Ambrosius hypothesis, inspired by the *Historia Britonum* – whose author may have been the first to speculate along these lines : Myers 1960; Morris: 71 ff.

[8] While the Vita implies a pre-existent cult, certain details of the Passio just might suggest otherwise: cf. my note 6 and Wood: 12 : "it may be that Germanus actually discovered the tomb".

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Alternatively, however, the cult might have evolved as an earlier expression of British regional sentiment, along the lines we have suggested above. But in either case, if Alban represented in some way a (pan-)British sense of identity, then Germanus's actions to bring him as firmly as possible within the Orthodox fold - and his pre-occupation with this cult to the neglect of any other, as far as our sources are able to reveal - all make that much more sense.

Our theory so far might be deemed intriguing and plausible, but entirely unprovable. There is no incontestable or substantial evidence in its favour. Yet if it is true then the implications for this little-known period - even if arguable, themselves - are surely very considerable. It is, therefore - in my judgement - something that we simply cannot afford to ignore. It might be worthwhile, then, to attempt an assessment of all the circumstantial evidence we can uncover so that we can come to a better assessment of its probability, even if we can never formally prove it. Can we find any further suggestions that the martyr Alban really had the kind of origin we have suggested?

A notable fact about the subsequent development of the cult is that while it seems to have survived, or was anyway restored, at Verulamium, itself, there was never a very impressive cult of St. Alban in later medieval Britain, while, by contrast, the martyr did have quite an extensive cult on the continent. It might seem particularly surprising that the cult seems barely to have survived at all amongst the Celtic inhabitants of the island with whom it had been originally associated. This might seem especially problematic for our theory which has suggested that the Celtic inhabitants of the island had, at one stage, identified closely with the 'martyr' as a kind of religious symbol of their island's identity. Why is there virtually no sign at all of this once-dominant cult-figure in the Celtic regions, subsequent to the mention by Gildas, in around the mid sixth century?

There was, in fact, a cult of St. Alban at Caerleon in Gwent, but Levison has shown (1941: 340-3) that this was attracted there by a pre-existing cult of Aaron and Julius, under the influence of the mention of these three early martyrs together, by Gildas. Something similar may lie behind the presence of a village of St. Alban in North East Brittany, which is very close to a village of St. Aaron. As Loth (1910: 8) pointed out an original early 'Alban' would have become

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'Alvan', by the normal process of the development of the Brittonic languages. However it still remains possible that an earlier 'Alvan' - or something similar (see below) - could have been modified under the influence of the (original) form of the name popularised by the pan-European cult of the British martyr.

In fact there is another Breton saint who seems to have been identified with the British martyr. This was not a saint 'Alvan', but rather a saint 'Elven', the patron of Kersaint Plebennec and eponym of 'Elven', near Vannes [9]. There was a tradition that the patron of the latter place was actually St. Alban (Loth: 131; Lowe: 59). As Loth remarked, 'Elven' could not be derivative of 'Alban', but it could, of an old Celtic name like 'Albanios', due to the philological process of 'vowel affection', whereby the presence of a certain kind of vowel later in the word effects other vowels, before it (here the 'i' influences the preceding 'a's, raising them into 'e's). It would, therefore, also be possible that it is derivative of a name that contained the root *albi(i̯)o-*, - like the old name for Britain and our hypothesised Celtic name, derivative or related to this, that stood behind the 'Latin' name 'Albanus'. By way of comparison the Welsh word *elfydd* (*elbid* in Old welsh), meaning 'world, or 'land', is thought to be derivative of the root *albio-*, and, in fact, to be a clue as to the meaning of 'Albion', as the original name for Britain. Closely related is the form *elvydden*, of similar meaning, which has been thought to be derivative of the ethnonym, 'Albiones' (Williams 1931/3: 134; *GPC* 1205-6; O'Rahilly: 385; Evans: 301; Hamp 1982/3: 291; 1989: 109-19; 1992). The match with these is not exact since 'Elven' does not contain the *-ydd-* element but in fact, although Brittonic *-io* sometimes developed - via *i̯io* - into *-ydd*, it did not always do so and the precise factors governing whether it did or did not are very complex and still poorly understood. So it is quite possible to envisage an alternative development (especially, perhaps, if semantically divergent) of *albio-* to just *elvi-* (or *elv-* if the *i* was lost as part of the final syllable: Jackson 1953: 347-58; Russel 1990: 56-8, with note 85; and especially Vendryes 1951: 1-10: cf. Koch 1990: 4). It is worth bearing in mind that the 'Elv(e)-' in 'Elven' might be

[9] Loth: 131. The earliest record of 'Elven' is in a charter of 910, extant in a late 11th c. MS (in M.Aurilien de Courson, *Cartulaire de l'Abbaye de Redon*, 1863).

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derivative from a number of forms with *albi(i)o-* since the final *-(e)n* might represent a suffix, as found in other Welsh and Breton names (Pierce: 90, cf. 88, 69; Fleuriot 1964: 401) , added at a relatively late stage (we shall return to this idea, below).

The Breton saint's name, 'Elven', then, just might be a clue that there was a Celtic 'equivalent' to Alban, that contained the root *albio-* . This, in turn, might explain why there is no identifiable cult of Alban in the Celtic regions, - because any such cult will have used the Celtic equivalent to Alban and this name will have evolved into 'Elven', or a name beginning in 'Elv-'. It is true that the cult of 'Elven' is a very small one and is limited to Brittany. However, as we will discuss further below, it is possible that as the cult lost its original identity and fragmented, so localised - and corrupt - variants of the name might have evolved so that 'Elven', itself, might represent just one (of the least devolved?) of these.

We can refer back, at this point, to the Life of St. Germanus. The only named Briton, in this work, is one 'Elafius', "one of the leading men in the country", whose son Germanus cures on his second expedition to the island, thereby confirming the faith of the locals in himself and the orthodox doctrine he represented (*Vita Germani* XXVI, XXVII). It is, perhaps, rather curious that this name rather than any other was actually remembered - unless it had some kind of special significance. In fact it might seem unlikely that the actual name of the father of a boy cured, or apparently cured, by Germanus will have been remembered - when so few other accurate details of the British expeditions of Germanus, were. In any case the story, as told, suits the purpose of the author, too well, to be likely to represent a straightforward account of the actual facts as accurately remembered by contemporary witnesses: if not entirely fabricated it has almost certainly been embellished, exaggerated and given a greater significance than it will have had at the time. In fact Ian Wood (16-17) regards it as an 'allegory', comparable to Germanus's healing of a blind child on his first expedition to Britain (*Vita Germani* XV) and designed by Constantius to illustrate the 'healing' effect of the bishop on the spiritual health of Britain, in general. If that is the case then we might have a clue as to why this rather uncommon Greek name is the only one recorded in connection with Germanus's expeditions to Britain.

'Elafius' would have been pronounced [Elavjus], or similar, in

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Vulgar Latin[10] and this looks as though it just might have been a name that was chosen as the nearest familiar one, to Gaulish Latin-speakers, to a native British [ElβjəƩ], or similar, as representing contemporary pronunciation of the name 'Albiəs', which in turn might represent one version, at least, of that name associated with the ancient one for Britain that, we have hypothesised, stands behind 'Albanus'[11]. It would then have that special reference to 'Britain in general' (and its spiritual life) that would make it fit the allegorical context here, in an ideal way (even if, admittedly, it is the son of Elafius rather than actually he, himself, who is cured). Recent theories about the date of the relevant sound changes ('a' to 'e' by 'final' vowel affection and 'b' to 'β' by lenition) involved in the evolution of 'Albios' to [ElβjəƩ], in a Brittonic context, would allow an early enough date (early fifth century) for this form to have been current at the time of the visit of Germanus[12], although we can bear in mind that the interpretation of [ElβjəƩ] as 'Elafius' might be associated with the conversion of oral to written tradition at the time of Constantius's writing of the Life, circa. 480. It is important meanwhile that the phonetic correspondence between the two forms we have quoted above is quite close: the initial 'e', of [Elavjus] will have been stressed (like the 'e 'of [ElβjəƩ]) and long, so that the following vowel-sound, 'a', might have been relatively unnoticeable in speech, while β and v represent very similar sounds. This degree of correspondence does not look like the kind of thing that is

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[10] Grandgent 1907: 135: "it is probable that intervovcalic f became v at the end of the vulgar Latin period" : our f is between a vowel and a semi-vowel. Page 76 : "in Northern Gaul all stressed vowels were apparently long" . *-ius* will have been pronounced *-yus* (p. 93 ; Jackson 1953: 363) but Latin and Celtic endings were often closely equivalent and easily confusible.

[11] Might a popular cult-name have required that the stress (always on the penultimate syllable in British Celtic) be actually on the 'Alb-' element ? The name 'Elafius' was a familiar one in 5th century Southern Gaul: see Mathisen 1999: 144.

[12] Sims-Williams 1990: 260, 238-9, 247-8. Cf. Jackson 1953: 558, 560-1 for lenition (b to β) and 579-618 for 'final i-affection' (internal i-affection occurred only later). Russel (1985; 1995: 239-42; cf. Jackson 545-8 and ff.) suggests the development of b > β > v , after a liquid as in this case, should be attributed to the process of spirantization that occurred later than lenition (Jackson 565-73). But on the basis of Sims-William's dating and on the premise that all these dates refer to the phonemicisation of earlier allophonic changes it might, perhaps, still be possible to envisage a pronunciation with b, by c. 480.

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discoverable by pure chance.

It is worth further bearing in mind that the suspicion has been entertained by some that the second visit of Germanus is entirely fictional and represents merely a 'doublet' of the first. The revised chronology of Germanus's life allows less time for a second visit (Thompson 1984: 55-70; Wood 14-16). Only the first visit is recorded by Prosper's (near-contemporary) chronicle while, as Norah Chadwick (1955: 255-61) noted, in both visits the object is the same, Germanus is accompanied by another bishop and (as we have noted already) the cured boy of the second visit is matched by the cured blind girl of the first. Then there is the fact that on both visits, as Germanus sets out, there are 'demons', active against him. In the first they provoke bad weather: in the second we are told they are unable to do this, but instead spread news of his approach. The change of Germanus's companion - Severus instead of Lupus - remains hard to explain[13] but it might have had something to do with the fact that the author (or his source) felt a need to clearly differentiate the second visit from the first. All sources subsequent to the Vita, meanwhile, are likely to have been influenced by it so cannot offer it any real support (contra Wood: 14, who quotes the *Vita Genovefa*). Then again the

[13] Wood: 14. Chadwick suggests an element of doubt, even in the involvment of Lupus, although he died only shortly before the writing of the Life. Constantius's Bishop Severus is identified as Severus of Trier (Duchesne 1907-15: 30-44) by Bede (I.21), influenced perhaps by the 6-7th c. (Ewig 1978) *Vita Lupi* (Krusch 1920) which named him as a pupil of Lupus but did not mention the second visit to Britain. Chadwick (p.255, quoting Levison), however, notes Severus, bishop of Vence, attested in contemporary evidence. The late tradition of the *Vita Severi* (*Analecta Bollandiana* V, 1886, 417-24) associates Germanus with a Severus of Vienne: a mention of the cult of Alban here, as well, might suggest this association goes deeper than a mere confusion of this Severus with the one of Trier. The *Vita Lupi* mentions the Trier Severus together with an Albinus, bishop of Chalons (Burchi: 721-2) whose late Vita (*ASS* Sept. III, 82-91) associated him erroneously with the anti-Pelagian expedition to Britain, suggesting, perhaps, some kind of confusion/association with Alb-anus. We might seem to have here a rather suspiciously consistent association between Germanus, the name Severus and names in 'Alb-' (for these see further, III below). If the name 'Severus' had associations in a (syncretic) cult-context that linked it to names in Alb- then that (a hypothesis impossible to substantiate here) might be the explanation - and might have influenced Constantius or his source. The name 'Severus' would then have entered the tradition by misinterpretation of a cult-name (in an oral context) like 'Elafius'. Some generalised association with the name 'Severus' might explain why it is the 'Emperor Severus' who appears as Alban's persecutor in some texts of his *Passio* (cf. my note 5).

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fact that the (few remaining) Pelagians are treated more harshly on the second visit might merely represent a desire to corroborate the success of the first visit while allowing a valid purpose for the second (contra Wood: 17). In fact the exile of Pelagians which Constantius attributes to the second visit is referred to by Prosper, even though he must have been writing before any second visit could have taken place (Thompson 1984: 29-30). If we do have a case of duplication, here, then it is likely to have been due to one especially distorted tradition of the visit having become unrecognisable as the same as that recorded in a more authentic version. Chadwick quotes Constantius himself in this respect: "So many years have passed it is difficult to recover the facts from the silence in which they are buried"; while Thompson (1984) emphasizes how poorly informed Constantius seems to be about Germanus's British visit compared to his activities in Gaul and Italy. In this context our suggestion that we have a garbled version of a name equivalent to Alban is more credible while it can be also be seen as another element of the duplication since the 'Elafius' (= 'Albios'?) incident of the second visit is in a way parallel to the 'Martyr Alban' (= 'Albios'?) episode of the first. Meanwhile might the rather odd detail that Elafius comes to meet Germanus, miraculously without news of him, represent some kind of recollection of the tradition of the miraculous appearance of Albanus to Germanus, as recorded in the *Passio*? If so it will have been adapted to fit in with, and might partly have inspired, the new role for the 'demons'. Most important, anyway, is the fact that, one visit or two, our theory offers some kind of explanation for the enigmatic appearance of the name, 'Elafius', which is not otherwise forthcoming.

It is true that the name 'Albios' need not necessarily contain the element *albi(i)o-* that is thought to be contained in 'Albion' and to have given later Welsh *elfydd*, meaning 'world, land'. It might contain simply the element *alb-*, as found in Latin *albus*, plus the termination *-ios*. There is some evidence for the existence of the root *alb-*, meaning white in Gaulish (perhaps from Ligurian, see below), even if this is lacking in insular Celtic. However it might seem a more obvious explanation that we have to do here with the Latin name 'Albius', itself, as it had come to be spoken within a Celtic-speaking milieu (Jackson 1953: 70 ff.) - and therefore pronounced like our hypothetical Celtic name. Latin 'Albius' was an old Roman

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'gentilicus' or 'clan-name'. As such it seems to have had a longer history as a Latin personal name than 'Albanus' which was perhaps originally more typically associated with the toponymy. 'Albius' certainly contained the root of Latin *albus*, 'white'; together with *-i(us)* as a suffix denoting a patronymic. In any case if our name is either this one, or one containing a Gaulish root *alb,* it would have a literal meaning associated with 'whiteness', and as such might have seemed an especially appropriate designation for a cult figure, while forming an obvious parallel to the name 'Albanus' itself.

All this might suggest we have nothing to do with the root *albio-* and the old name for Britain, especially since the *albio(n)* that gave *elvydd(en)* would have developed into something like [albidi-] by the fifth century and we see no sign of that. However, as we have seen, an alternative (semantically divergent) development of 'Albio- might have been possible and this is especially so in Gaulish where the stress might have been different [14]. However, more to the point, this raises the whole question of the precise relationship of the element *alb-*, to the element *albio-*, and of the exact meaning and derivation of 'Albion'. This was once thought to be related to *alb*, 'white', but is now more generally thought to derive simply from a word *albio*, meaning 'world' or 'land', (deduced from later Welsh *elfydd*) because, as an island, it was perceived as a world of its own, or, to its inhabitants, as 'THE land' par excellence. It has been suggested, however, that the element *albio-* actually derives from the element *alb*, and that the precise connotations of 'Albion', earliest recorded in reference to the people rather than the island of Britain, are rather more complex: we shall examine this further, below. Suffice to mention here that there is no problem in deriving 'Elven' from 'Albios/us' plus a suffix, '-(e)n'.

One thing that does seem clear is that if 'Albanus' had an alternative name 'Albios/us', which also had a literal meaning 'white', then it looks as if that literal meaning was relevant: in a way that it need not have been if 'Albanus' just simply happened to be the name of a genuine martyr and no more. Moreover this literal meaning becomes especially relevant when we consider the feast date

[14]14 Jackson 1953: 355-6. The position of the stress was an important factor determining i > d (Jackson 348; Russel 1994: 119). For differing stress patterns in Celtic, Russel p.15.

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for St. Alban, recorded in early rescensions of the 'Martyrologium Hieronymianum' [15] as being June 22nd, just one day after the date of the summer solstice. This is because 'white' or 'bright one' might seem a particularly appropriate name for a cult figure, or deity, with 'solar' attributes. It is true that the examples of the nativity of Christ and feast day of John the Baptist show that pagan festival dates could become associated with bona-fide Christian figures, but it remains significant that such an important date in the calendar should have been thought appropriate to our 'saint'.

It is significant, too, that the name 'Albius' was indeed appropriate to a Gaulish deity (of Lugdunensis : Duval 88, 58; see further below) and whether this represents a native name or just a Latin 'epithet', it undoubtably has reference to the 'whiteness/brightness' of the god. The familiarity of such a name, as used in this way of a deity, to the people of Gaul makes its use by Constantius's (Gaulish?) oral source all the more understandable: but would obviously imply a context of pagan-Christian syncretism.

Our theory might seem more credible if we can find more plausible derivatives from a name in 'albio' in the later cult evidence, besides just the 'Elven' who had a minor cult in Brittany. In fact there is one such which might shed more light on the questions raised above. A name which might immediately strike us for its similarity to our hypothetical 'Albi-' original is appropriate to an Irish saint, the patron of Munster: St. Ailbe. This resemblance would seem to be coincidental because the Irish derivatives of 'Albio-' are recorded as 'Albe-', 'Alpe-' and 'Albu, 'Alpu', as we have seen above, and there is no reasonable explanation for the mutation of such a form to 'Ailbe'. However, such a form might be explicable if it represents a derivative of a British cult-name, based on this root, borrowed in the fifth century. It might seem quite credible that the most important British Christian cult figure of that time should have been introduced into Ireland when Christianity itself was being introduced from Britain into Ireland. We might have recourse to our hypothetical 'Albios', again, bearing in mind that a different kind of ('final')

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[15]15 'In Britannia Albani martyris': see Delehaye 1931 (reconstruction of late 6th c. Auxerre 'revised version', ancestral to all extant copies, for the early ones of which: Duchesne 1894). Alban acquired numerous companions in the extant versions due to confusion/conflation with other entries.

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'vowel affection' could have occurred in this case. A type of vowel affection that produced *ei* from *a* (by the influence of a following *i*) was more typical of the North West or 'Welsh' dialect of the evolving British language, by comparison with 'South West British', from which Breton and Cornish are derived, which would be more likely to produce an 'e' (Jackson 1953: 581-3, 592-7: we would have to assume that the British of the South East, to which our [ElbjəΣ] presumably belongs, was similar to that of the South West). The likelihood is that a British cult will have been introduced to Ireland across the sea from Wales. The Welsh form of 'Ailbe' ('Albeus' in written Latin) was 'Eilfyw'[16], where the *ei* represents a sound similar to that produced by the *ai* in Ailbe, in which the *i* is not a full vowel but represents an audible 'glide' before a palatised *l* (Thurneysen: 55-7, §86). This palatised *l*, with i-glide (not found in Irish 'Albu') might itself have represented the nearest equivalent sound in Irish to a British 'Alb(ios)' in the first stages of i-affection. This is with the added possibility of assimilation to Irish 'ail', a rock, at some stage : Ailbe's name was interpreted as containing this word in his Vita (*Vita Albei* 2 in Heist: 167-81; trans. De Paor: 227-43). Meanwhile in early loans into Irish from British Latin *-ius* became *e* (pronounced 'i') as in Patric-ius > Cothrich-e (Jackson: 1953: 127-9; Thurneysen 94, 281) and the same would happen with Celtic '-ios', thus accounting for the final 'e' in Ailbe.

Of course Ailbe is regarded as an Irishman in Irish tradition but that is the likely result of a process of 'localisation' that is paralleled elsewhere[17] His character as bishop (rather than martyr) of Emly might have been acquired via a close association of the cult with the

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[16]16 E.g. in the 16th c. *Achau'r Saint* : "Eilvyw a Dirdan Saint Breudan" (variant : "Breudain"). Cf. *Boneddy Saint* (16th c. MS) : "Ailvyw vab Dirdan" : see Bartrum 1966: 67 (no.92), 70 (no. 35). 'Dirdan' looks like a mangled version of 'Prydein' (duplicated in 'Breudan'): this seems to suggest a special association with Britain, interesting even in this very late evidence. *Achau'r Saint* continues 'Plant Helic vab Glannauc' which might link Ailbe with the sea (*heli* < * *sali* = salt water) – cf. our suggestions for Alban, below – or, more persuasivley , with other Welsh cult figures in *(h)el-* (for which see V, below): cf. Ailbe's association with bishop 'Hylarius' (Hilary of Poitiers: *Vita Albei* 9) pronounced 'Hel-' in vugar Latin or as taken into British (Jackson 1953: 282-4) which might take this kind of association back into an earlier and Irish context: see V below.

[17]17 E.g. in the acquisition of an Irish 'persona' by the probably British 'Uinniau', resulting in the cults of various apparently Irish saints called 'Finnian' or 'Finbar'. See O'Riain 1977 and Dumville 1984.

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bishops, and any early episcopal organisation, of this area. What does seem particularly significant is the fact that the saint's legend (as reported in his Life, from no later than the eighth century[18] associates him with British settlers in Ireland. They are said to have brought him up after his abandonment at birth (*Vita Albei* 2), a story which looks likely to have been invented to reconcile his Irish birth with an enduring tradition of his actual British origin. He is further said to have been taken by these Britons back with them to Britain which allows him to be seen as having come from there to Ireland.

All of this concurs with the fact that the name, Ailbe, cannot derive from a native Irish-Celtic 'Albio-' or direct from Latin 'Albius' but could only represent a British development of either of these.[19] That leaves the possibility that he represents an actual (post-Romano-) British figure, called 'Albius': but there are other considerations to take into account. One is the prominence of the cult and the fact that Ailbe was regarded as one of the pre-Patrician saints of Southern Ireland. This latter fact might have reference to the resistance of certain religious houses to the claims of Armagh, at a later date, but on the other hand our hypothesis would suggest the introduction of the cult from an early date, perhaps even as early as 431, the date of the expedition of Palladius to Ireland - at which time we know from Constantius that the cult of St. Alban was dominant in Britain. Palladius, who was very likely associated with Germanus and probably visited the Southern half of Ireland (being most convincingly associated with Leinster: Thomas: 300-6), is said in the *Vita Albei* (c.2) to have baptised that saint .

Another point of interest in the *Vita Albei* is the name of Ailbe's foster-father, 'Lochan, filius Lugir': these two names can be seen to be connected if the former is for 'Lo͝chan', a diminutive based on 'loch', from 'leuk-', meaning 'bright' (DIL: 178; Thurneysen: 39-40, §60), and if the latter contains the divine name 'Lug', which on the most popular theory would have a closely related meaning, 'Bright

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[18]18 Sharpe: 390. For aspects of this Life 'more than ordinarily surcharged with the miraculous element', see, e.g., cc. 4, 9-12, 42 and further below.

[19]19 In Irish there will not have been palatisation of the l (shown by the i after the A) because of the 'i' (> e) after the 'b': Thurneysen 99-100, § 160. And there will have been no lenition (or spirantization) of the 'b' (the b in Ailbe will have represented 'b' : Thurneysen: 21, § 29) because it was in a group with 'l': Thurneysen: 76, § 121.

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One', or similar (Jackson 1953: 441; Evans: 219 with more refs.). These names would also have a similar meaning to our hypothesised 'Albios', if this represents a name equivalent to Latin 'Albius' -if not that name itself - meaning 'white' or 'bright one' (and, as such, as we have seen, making good sense of Alban's summer solstice feast date). 'Lochan' and 'Lugir', then, would represent names that entered the tradition as alternatives, or 'by-names', for Ailbe/Albios (or conceivably the names of deities he became assimilated to?).

It is important in this respect that there is no recorded native Irish reflex of Indo-European *albho-*, 'white', from which Ailbe might derive. The appearance in medieval Irish literature of various probably mythologically derived figures called 'Ailbe' gives the appearance that the saint's name, too, has its origins in a native 'mythological' milieu: however it is quite possible to envisage an assimilative influence in the reverse direction since the Christian cult must have started off at Emly by absorbing a native pagan cult (Kenney: 313-5)and that process might have continued, with the Christian cult-name replacing the pagan name (and perhaps some of its variants or close relations) in its manifestations in other localised contexts and associated mythological tales. That original pagan cult may have borne some relation to the one we have hypothesised lay behind our Gallo-Brittonic Alban/Albios, although it may have been mainly political considerations that determined that this leading Christian cult (amongst the British Christians who brought the faith to Ireland) was located at this important native Irish cult centre. In fact it is just possible we could be dealing with some kind of Irish equivalent to the British-pagan one lying behind St. Alban[20] AS WELL AS the one displaced at Emly. As to the former we will be suggesting why a specific pagan Irish theonym would have been especially prone to assimilation to 'Ailbe' in Part IV, below. As

[20] An 'Ailbe Grúadbrecc' was daughter of Cormac (premier mythical Irish king) and a wife (as her sister Grainne) of Finn (= literally, 'white'): see the *Tochmarc Ailbe* (O'Rahilly: 276; J.F.Campbell, *Leabhair na Feinne*: 151; German trans. in *ZCP* 13), *Echtrae Cormaic maic Airt* (in Cross: 503-7) and *The Burning of Finn's House* (in *Eriu*,1904). Ailbe was also the name of several of Finn's *fianna*,and their women (*Acallam na Senórach* in Dooley 1999; *Duanaire Finn)* while an Ailbe was daughter of Mider, son of the Dagda (Dooley: 15). We might have to do, here, with the underlying pagan solar associations of the British cult: encouraging a relationship with figures of a comparable origin in Irish mythology. Cf. the Ailbe of the *Navigatio*, below, and see Part IV.

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regards the latter its nature must be hinted at by the name preserved as that of Ailbe's father, 'Ol-chu' ('Olcnais' in *Vita Albei* 1), 'great-hound', as well as by the story of the infant Ailbe being cared for by a she-wolf.[21]

To return to the name Ailbe, itself, we might have a further hint that our interpretation of it's solar associations is correct from the way that the saint is described in the late eighth century *Navigatio Brendani* (c. 12 in Selmer: 29):

"senex nimie gravitatis, capillis niveo colore et facie clarus"

The context, here, might suggest that we have to do with more than an old man of radiant saintliness since Ailbe is abbot over a community of monks on an island, and an 'island' in this work, that clearly has some of its roots in Celtic pre-Christian tradition,[22] might be taken as a metaphor for the Celtic 'Otherworld': in which case Ailbe would, in some sense, represent its presiding deity. Some kind of special relationship between Ailbe and the 'Otherworld' might be suggested by the *Vita Ailbe* (c. 42) in which Ailbe boards an 'Otherworld ship' (which no-one else can) three years before he dies. At the same time the relationship of Ailbe to his island, in the *Navigatio*, might be seen as equivalent to our hypothesised relationship of Alban to the island of Britain. One might compare the Irish 'Otherworld' deity 'Manannan' (e.g. Bromwich 1978: 441-3; Gruffydd 1953: 80), whose name is clearly related to that of the real island, of 'Man', with which he was associated.[23] Furthermore that

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[21]21 Ailbe is the name of a 'divine hound' (see *The Story of MacDatho's Pig*, trans. in Cross 1936) associated with the Mag (= 'plain of') Ailbe. Associated with the latter is the 'Lia (= 'stone of') Ailbe' (Kenney: note 84) which might show assimilation of *ail* (= 'a rock') to 'Ailbe' if the name is ultimately tautological: see further IV, below. The conflation of the native Irish (Emly) cult and the British one may have been encouraged by a degree of phonetic similarity (and so assimilation) if the name of the figure(s) associated with the former had to do with the first element of 'Ol-chu' or Irish *ail*, 'a rock' (bearing in mind the religious associations of rocks, menhirs etc.. in early times).

[22] For a secular parallel that demonstrates this see *The Voyage of Bran* in Meyer, K: 1895. Cf., also, the *Imram Maelduin* in Stokes: 1888. Ailbe is also associated with an island in the *'Imram Hui Corra'* : Selmer, p.99.

[23] Cf. 'Aranrot', her 'Caer', the isle of Arran etc.., Thornhill: 493. For a relationship of divine name to tribal names (cf. 'Albiones') , O'Rahilly: 30-3, Maccana: 129, note 1 but cf. Rivet 410-1, 419-20

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there existed tales which interpreted Britain as somehow representing the 'Otherworld', or 'world of the dead', is suggested by Procopius who passes on to us a story about the ferrying of the souls of the dead across the Channel, from the continent, to Britain (*History of the Wars* VIII.20). We have noted St. Alban's power over the seas around Britain and we can compare both Manannan's patronymic - 'mac Lir', 'son of the sea' – and Ailbe's association with an 'Otherworld' ship. In chapter IV of his *Vita,* Ailbe's controle over the stormy sea is very comparable to that of St. Alban while it may be no coincidence that, just as Alban demonstrates his power over the sea in the English Channel it is precisely there, too, that St. Ailbe is able to remain afloat in a wrecked boat, and, finally, cross miraculously, 'seated on his cowl'.

The identification of Britain (= Albion) as, in some sense, the 'Otherworld' brings us back to the question of the precise derivation of 'Albion' as the name for Britain, or 'Albiones', for its people. It is relevant that some personal names recorded from the Celtic regions (Evans: 301-4; Holder: I, 82, 86) may, if they represent Latinised Celtic rather than just Latin, contain the element *albio-*: thus 'Albio', 'Albiunus' and 'Albius', the last of which would be an exact match for the name that we have suggested lies behind Elafius and Ailbe. A name that certainly contains the Celtic element is 'Albio-rix', where the formation looks very close to that of the names 'Dumno-rix' and 'Biturix', which would have the same meaning, 'world-king'.[24] Irish *dumon*, for instance, from *dumno-*, means 'world' and so can be seen as parallel to Welsh 'elfydd'. In fact it is these comparisons that have confirmed the theory of the existence of a Celtic *albi(i)o-*, meaning 'world, land'. However, it has also been suggested that *albio* derives ultimately from the root *alb-* - more properly *albho-* that is found in Latin 'albus' (Meillet: 20; Pokorny 1959: 30-1). Although there is no derivative of *albho-*, with the meaning, 'white', in any of the modern or mediaeval Celtic languages (Jackson 1948: 54), there are some words recorded from Gaul which

[24] Evans: 243-9, 301-3; Holder: I, 85; **Vendries**, ***Revue Celtique*** **45**, p.122; Rivet: 248; Hamp 1989: 109; Whatmough 1970:§ 7,8, 82. It is recorded as a personal name in Angora (Αλβιοροιξ), a divine epithet in Sablet, Vaison/ Vaucluse ('Marti Albiorigi') and a divine name in Saint-Saturnin d'Apt ('Albioric') and the Cottian Alps ('Albiorix' with the probably related personal name 'Albiorigius', or 'Albiorigi').

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seem to contain the root, *alb-*, with the sense of 'white',[25] and there is an analogy in Slavic for a shift in meaning from 'white' to 'world' (Evans: 302; Pokorny: 30)). The root, *albho-*, meaning 'white', or with an associated meaning, appears in German and Greek with a possible close relation in some of the Slavic languages, as well as in Latin (Pokorny: 30; Meillet: 20). It must certainly, then, have featured in any language ancestral to both Celtic and Italic, while the examples from Gaul may represent survivals of 'Ligurian' (Whatmough §1, p.31), a language which was Indo-European (or at least included an Indo-European 'super-strate') and which may have been intermediate between Celtic and Italic (Whatmough: Prologomena; Schmidt 1997: 164-5). It will have existed, then, in languages closely related to Celtic if not in Celtic, itself. Even if Italic and Ligurian were not related especially closely to Celtic 'genetically', they certainly were in terms of spatial proximity and prolonged contact so that words from these languages may have been borrowed by Celtic if they were not originally shared with it.

Another relevant factor is the existence of *alb-* as a common and widespread toponymical element: in river-names (like 'Albis', behind the modern 'Elbe' in Germany, or the Greek 'Alpheios', that flows past Olympia (Lebel: 1939: 126-7; Holder I, 77, 85; Pokorny: 30; Dauzat 1978: 22,23), and in mountain names (Dauzat 1978: 104-5; Pokorny: 30; Bertoldi 1931: 148-9), perhaps but not necessarily including the 'Alps' . Settlement names where 'alb-' has a probable meaning 'hill' or 'mountain' are apparently linked with the latter but a few others appear to be derivative of the hydronym (Lebel: 127). It is arguable whether all or some of these are linked to the Indo-European root, *albho-*, 'white' while there is also the question of the relationship of (some or all of) these to the names of peoples in 'Alb-' - like the 'Albici' of Southern France, or the 'Albani' of the Caucasus - and, finally, to the names of divinities in 'Alb-'.

Amongst the latter is the name 'Albio-rix', mentioned above. It is important that while the comparisons that would indicate that this contains the root *albio-*, 'world', are persuasive, it is almost impossible to disassociate the cult-name in its local context from the

[25] *Albispinus*, 'aubépine'; albucium, * albuca (deduced from Provencal aubugo), 'white, marly earth'; albucrarense, a type of 'metallum': Evans 302-3; Holder I, 87; Whatmough:§ 1 (pp.31, 433).

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element 'alb-' as found in the local toponymy. A large proportion of local cult names, in general, are associated with the local topography, in this way. Two altars inscribed with the name, 'Albio-rix', come from the region of the Ventoux mountains, where there was an 'Albionensis pagus', recorded in 960, the name of which was evidently based on the 'mons Albionis' here, recorded from about a century later. Meanwhile this whole area was within the territory of the 'Albici'. The other occurrence of 'Albio-rix', as a divine name, comes from a temple, apparently dedicated to this god and Apollo, high up in the Cottian Alps, near the col du Mont Genevre on the current Franco-Italian border (Rostaing 45, 46 with note 2; Barruol 1963). The suggestion is that 'Albio-rix' has some link not only with the 'mons Albionis', in particular, but also with *alb-*, as an element associated with mountains in general.

It is relevant for us, of course, that mountain names are often related to island names and it has long been suspected that 'Albion', as a name for Britain, is related to other toponyms in 'Alb-'. It is important that the theory that derives 'Albion' from just *albio*, 'the land', is indissolubly linked to that element as found in the cult-name, 'Albio-rix'. The British name does, in fact, have very precise parallels elsewhere: thus the tribal name, 'Albiones', used for the people of Britain, is also found in Spain[26] while the form 'Albion-' is found in several Gaulish river names[27] and at least three mountain names from the South of France, including, of course, the 'mons Albionis' we have associated with the cult-name 'Albio-rix'[28]. This latter becomes especially significant given that Wolfgang Meid (1990) has explained the form 'Albion', itself, as a cult-name formed from *albio-* plus the suffix *-no-* (Hamp 1986), typically denoting a cult-figure or 'superior being': so that the 'Albiones' would represent the people or devotees, of 'Albion'. 'Albion' would then represent a name directly parallel to 'Albio-rix', with the suffix, *-no-*, having an

[26] Pliny, *Natural History* IV.3 (Rivet: 48); although given their location in North West Spain these people could represent immigrants from Britain: cf. the later emigration of Britons to Bretoña.

[27] Lebel: 127, note 1; Dauzat 1978: 23 : the 'Aujon', tributary of the Aube < Albis, the 'Ajon', Calv., the 'Oujon', West Switzerland, the 'Ojon', Loire.

[28] Also the 'Mont Obiou', Isere (Rostaing: 46, note1); 'Mont Albion', Drome (Dauzat 1978: 105: 'Alb-' plus suffix 'ione').

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equivalent value to *-rix*. Our association of 'Albio-rix' with local names containing 'Albion-', would seem to support the notion of their equivalence.

Moreover the fact that the name, 'Albion', was appropriate to a cult-figure in the context of Southern France is well demonstrated by a reference of Pomponius Mela (*De Situ Orbis* III), writing in the first century A.D. He mentions an 'Albionus' in his version of the episode of the Hercules legend that is localised at 'Le Crau' in the Rhone Delta, in which that hero defeats his opponents, aided by Zeus who causes enormous hailstones to fall, thus providing Hercules with 'ammunition' to use against his foes and explaining the existence, here, of a stony plain. Although there is some doubt about the form of the name[29] it seems likely that 'Albion', with variant 'Alebion'[30], is the correct form, and that this 'Albionus' represents a euheumerised deity appropriate to this region: as seems to be the case, for instance, with Hercules' more famous opponent, in this group of legends, 'Geryon' (Graves 1955: 132.4, 31.6; Hesiod, *Theogony* 287 ff.). There seems little doubt, meanwhile, that the name of this figure is related to similar names in the local toponymy (as 'Bergion' is to a 'Bergine civitas'), in particular the name of the local tribe, the 'Albici' (Berthelot: 69; Jullian: I, 226).

It does seem, then, that 'Albion' served as a cult-name. On that basis we would have to assume that the mountains or rivers, so named, were also named after the divinity or perhaps, rather, that - originally, at least - the mountain or river was perceived actually AS a divinity (the 'separation' of the two perhaps belonging to a later

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[29] The story was recounted by Aeschylus in his lost play *Prometheus Unbound*, as quoted by, e.g., Strabo (*Geography* IV.1.7.of circa. 7 B.C.: cf. Hyginus, *Poetica Astronomica* ii.6.) but there Hercules' enemies are simply 'Ligurians'. Mela names specifically 'Albionus' and 'Bergion' ("contra Albiona et Bergion") which names are clearly related somehow to the 'Ialebion' and 'Dercynus' who appear in the version of Apollodorus (*The Library* ii.5.10 of the 1st or 2nd c. A.D. : so Frazer in the Loeb ed., 1921). But in fact *ιαλεβιωθ* is only the form of the best MS (Parisianus 272), apparently the archetype, from the 14th c. Other MSs give *αλεβιων* (Frazer, note 3, p.214; pp. xxxiiii, xxxvi; R. Wagner, 1965 ed., p.84) as does Tzetzes, a Byzantine grammarian of the 12th c. (who may have had access to a superior copy of Apollodorus) in his *Chiliades* (II, 340ff : *Αλεβιωνα*) and *Commentary on Lycophron* (l. 1312 : *Αλεβιωνος*). Mela is the earlier source and, living in Spain, might have known a more local version of the story.

[30] Cf. Greek *αλιφατα* and *αλιφος* (Chantraine: 67) and see Bertoldi 1930: 262, with note 3; Evans: p. 304 ('Alibanos').

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phase in the development of religion). This might help us with our outstanding problem: to reconcile the indications that 'Albio-rix' is a name that contains the element *alb-*, as associated with mountains, with those that it contains the element *albi(i)o-* and so means 'world-king'. The answer perhaps lies partly in the involvement, here, of more than one strata of language: not only Celtic, to which *albi(i)o-*, meaning 'world', would be appropriate but also an earlier strata of 'Ligurian', which, we have already suggested, contained the root *alb-*, meaning 'white'. As a theonym, 'Albio-rix' had not only an appropriate meaning in Celtic but also deeper roots in the Ligurian substrate : this would be an example of the continuity of a cult-name, ensured by its re-interpretation in a context of linguistic succession. Ligurian not only contained the root *alb*, meaning white but the also the root *Alb-*, as a toponym (often suggestive of a meaning, 'mountain'). This latter is especially common throughout the region once occupied by the Ligurian people. In the West of this region had been the 'civitas ALBigensium' (Dauzat 1963: 8) in the middle the 'AlBici' (Caesar's *Civil War* I.34; Strabo's *Geography* 4.6.4)) and the important town of 'ALBa Helvorum', (Dauzat 1950: 8) while to the East (now in Italian Liguria) had been the 'Albingaunenses' or 'Albingauni Ligures', and the important town of 'ALBa Pompeiana'(Conway: 357-8). Meanwhile French settlement names said to be derived from pre-Celtic 'alba', are concentrated in this area (in Isere, Ain, Savoie, Basse Alpes, Ardeche, and Drome (Dauzat 1963: 8; Rostaing: 45-9). Finally the 'Albionus', in the Hercules legend, while perhaps especially associated with the 'Albici', seems to represent the Ligurians as a whole since earlier versions mention simply 'Ligurians', while another pairs him with one 'Ligur' (my note 29). The suggestion is that this name was appropriate to one of the principle deities of the Ligurians as a whole. We might guess that if this name, 'Albion-' or the root *albio-* it is based on, was especially associated with this people, their deity, their region - and its mountainous terrain in particular - then *albio-* might come to mean to them (or to their Celtic successors and/or overlords) 'THE land'; and from there 'any land', or 'the world in general'. The word with this meaning might then have spread to Celtic Britain, but we might anyway envisage a parallel development here where the name (and the deity it denoted) might have originated with a pre-Celtic Indo-European strata related to Ligurian (and/or Germanic). 'The

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Land', referring here to the island of Britain, would be especially well defined as a 'world' of its own. Alternatively Meid (1990) has suggested a mythological explanation for the evolution of *albi(i)o-*, 'world', from *albho-*, 'white, light'. According to him 'albio' would have come to represent the 'world of light', by contrast with the 'dumno-' (as related to later Welsh *dubh*, 'black') of 'Dumno-rix', which would represent the 'dark world' : the two representing a polarity archetypal in mythology.

We might certainly suspect that the meaning of *albho-* as 'white, light' has to do with the apparent occurrence of this element in divine names. This would mesh with our observations about St. Ailbe and St. Alban, and it might further be significant that 'Albio-rix', in the Cottian Alps, was paired with Apollo (Barruol: 356), a god typically associated with the sun. It remains to explain why these names contain *albi(i)o-* rather than simply *albho-* but the example of the Latin family name 'Albius' shows that forms with the 'i' might still be associated with the meaning 'white'. It appears to be such a form with 'i' that stands behind the Ligurian tribal names, 'Albici' (or 'Albi-oeci') and 'Albi-enses' and these may have to do with the value of this suffix as a patronymic in Celtic as well as Latin (e.g. O'Rahilly: 231 with note 3) . In any case there are plenty of examples of cult or tribal names that have variants with or without the 'i' (O'Rahilly 31, note 3 and cf. 'Alaunius'/'Alaunos': Holder: I, 77) so that there is no problem in seeing the evolution of *albho-* to *albio-* in this context.[31] There is then no problem in understanding the origin of *albio-* as a word meaning 'land, world': on the assumption that this word did indeed derive from the cult/tribal name, rather than vice versa.

All of this makes much more explicable the fact that we seem to have found an 'Albios' associated with St. Alban, understood as the patron cult figure of 'Albion'[32]. It is true that our hypothetical

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[31] Perhaps we have a process of interaction between divine name and ethnicon : a divine name, based on *Albho-*, will have been reformed on the basis of a derivative ethnicon *albio-*, as *albio-no-*; the ethnicon will then have been reformed on the basis of the new divine name as *Albiones*.

[32] In a probably Illyrian context Strabo (*Geography* 4.6.1, 7.5.2) used a form: Αλβιος ορους for a mountain in the Julian Alps also recorded by Ptolemy under the name Αλβανον ορος : Hubschmid 1951: 44; Krahe 1955: 55. This seems to match the equivalence between the names 'Albius' and 'Albanus' we have suggested in our fifth

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'Albios' is only detectable in the fifth century and that it may even represent a Latin name rather than a Celtic one (although the existence of a Gaulish deity 'Albius', see further below, is relevant in this context). However even if it is not the direct descendant of an ancient cult name that lies behind both 'Albion-', and *albio-* with the meaning 'land, world', we can now understand the basic ethnic and cult traditions that might have brought it into being on the same basis. We have a viable theoretical basis here for its association not only with a solar cult figure but also with the old name for Britain.

Meanwhile, we need to remember here, all along, that the location of 'Albio-rix' and our various names in 'Alb-' that parallel British 'Albion', in the South of Gaul, derives an especial relevance from the fact that there seems to have been a special connection (the precise degree of which remains uncertain) between the cult of St. Alban and bishop Germanus whose bishopric if not quite within the area of 'Ligurian' Gaul was certainly close enough to be influenced by its cult traditions. So we have the possibility of some kind of reinforcement - actually within the fifth century - of ancient cult traditions associated with the name 'Albion' from parallel traditions associated with the 'Alb-' names of Liguria. (In fact this line of thinking might incline us towards the idea that Germanus was somehow the originator of the cult, or resposible for its introduction into Britain, but it is impossible to be sure about this).

An implicit assumption that we have made here is that the element *alb-* is linked not only with mountains and the toponymy, but also with the names of deities, their 'solar' qualities and the meaning 'white, bright'. It is worth looking at the wider evidence that might support this. Many of the river names have been associated with *albho-*, 'white', partly no doubt, because this is a quality easy to associate with a foaming or reflective watercourse (Pokorny 1959: 30; Hubschmid 1955: 45). In the Germanic languages a root, *alb-* is found not only in river names like the Elbe but in words with the general meaning 'river', and also in words meaning 'whitish, pallid', and, apparently by extension from - or at least associated with - this, 'ghost, evil spirit' (Pokorny: 30; Hubschmid: 45; De Vries 1956/7: § 170). It does seem likely, meanwhile, that there is a link between the

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century cult context.

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Greek river name λλφειζ and the Greek word αλφοζ , meaning a 'whitish patch on the skin', 'leprosy' (Pokorny: 30; Graves 1955: 22.g; Chantraine: 67), while 'Albula', the old name for the Tiber, may well contain the root of Latin *albus* (Pokorny: 30; Meillet: 20).

Although there is often a link between 'hydronyms' and 'oronyms' (e.g. the hydro/oro-nym *ar-*, see Thornhill 1999, or *dor*, see Dauzat 1978: 40,139), it is harder to link simply the quality of 'white' with the topographical element *alb-*, or *alp-*, found in hill or mountain names (unless we are dealing with high snowy mountains) and in settlement names. Hubschmid (1955: 44-5), for instance, has noted that the 'Mons Albanus' of Latium could hardly be regarded as 'white' and that it would anyway be unusual for an oronym to be derived from an adjective alone. He further doubts any link between 'Alb-' and the 'Alp-' in 'Alpes' and in fact suggests the value of 'Alb' as an oronym is only secondary to its use in settlement names. The link between the two is the fact that fortified settlements are often on high ground : Hubschmid notes that several settlements in 'Alb-' are on low lying ground and suggests that in these cases the settlement name cannot have come from a 'hill' name.

However, as we have suggested above, an ultimate link between, *albho*, 'white', with oronyms (and of these with hydronyms) might be easier to envisage if the former was typically associated with divine names. Hubschmid (1955: 44) notes that many place names with 'Albanus' contain this as a personal name rather than as an oronym, but in fact what appears as a 'personal name' might actually have been a 'divine name' (originally, even if understood differently later) and in fact it is perhaps easier to conceive of a popular and widespread divine name at the root of most such names than of the especial prevalence of people called 'Alban' having places named after them. The 'Mons Albanus' would then derive its name from 'Alb-' as appropriate to a divinity: all the easier to believe, given that it was clearly the focal point of the religion of early Latium (e.g. Frazer: ch. XIII). It is impossible meanwhile to disassociate the name of the legendary 'Alba Longa' from the mountain name and one might suspect that the latter was primary. In any case we can imagine that the evolution of the name 'Alba' as a settlement name might have had something to do with the original association of that name with a divinity patronised by the tribe, or people, to which some of the settlements belonged, as well as with its association with

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mountains or high ground: although it is always possible to reverse Hubschmid's theory and suggest that settlements named 'Alba', on low ground, only show that 'Alba' (= 'hill, mountain') acquired the sense of '(fortified?) settlement' as a secondary meaning (cf. Germanic *burg*, 'castle' from *berg*, 'hill, mountain: Hubschmid 44). Meanwhile, even if the association of names in 'Alb-' was primarily with a divinity (and the meaning 'white, bright') and its association with mountains or hills was only secondary (but see further IV below) the latter remains valid and we may suspect that the common-sense assumption that *alb* and *alp* do not owe their evident closeness in form and meaning (and geographical distribution) to mere coincidence, is indeed a correct one.[33] The association of 'Alb-' with mountains and the toponymy might, meanwhile, have been an

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[33] See Evans: 302-4 and Meillet (: 20), who denies any link between *Alpes* and *albus*, 'white'. Hubschmid 1955: 8-11 derives *alpes* from a Gaulish *alpis*, meaning 'mountain pasture', noting the many e.g.s of *alpes* in the late Latin sources – and in the Romance languages – with this meaning and with a distribution that conforms to that of Gaulish at an earlier date. Hamp (1960) supports Hubschmid so far but not in his analysis of 'alpis' as containing the Indo-European root (Pokorny 1959: 26-7) *al*, 'to nourish', plus suffix, *p* . Cf. Guyonvarc'h 1959: 437-40, who furthermore doubts that *alpes/is* is originally of Celtic origin (cf. Whatmough, p.31). *Alpes* is found with a meaning 'alti montes' outside the Alps (Hubschmid 1955: 8; Guyonvarc'h 438) and Hubschmid is compelled to explain Corsican *elpa*, 'rocky mountain' as a late borrowing from Tuscan. It remains possible that Celtic *alpis*, 'mountain pasture' derives from *alp-*, meaning 'mountain', rather than vice-versa, possibly under the influence of the Celtic root *al*, 'to nourish'. The *p-b* discrepancy between *alp-* and *alb-* had been explained as due to 'Etruscan intermediaries' (e.g. Bertoldi 1931: 148): Hamp discounts this on the grounds that the distribution of the Romance forms in *alp-* is too wide. But we might be dealing with other, non-Indo-European, languages – that may, typically, have survived longer in remote mountain areas - where the *-bh-* of Indo-European *albho-* may have been converted to *-p-*. Cf. Hubschmid 1955: 44 "ein vorindogermanischer Wechsel von b: p". This form will then have been borrowed by the latest wave of Indo-European intruders, the Celts, and perhaps given by them a new, more specific, meaning. In any case we should not forget the fundemental likelihood that words of similar form and meaning (and geographical distribution) are likely to be related. This was the conclusion of Bertoldi, Dauzat, Rostaing and others: see, e.g., Dauzat 1978: 105-6 where *alb/p* is seen in a wider context of related pre-Indo-European forms: what we might in fact have is the assimilation of names in pre-Indo-European *al-* to Indo-European *albho* (see further Part IV), sometimes "mis-pronounced" under a lingering pre-Indo-European influence as *alp-*. This interpretation (together with the one we have given of 'alb-' in toponyms) allows us to see the association by classical authors of *alpes* with *albus* and with a meaning 'high mountains' as both fundementally correct and above all confirms the comment of Strabo (*Geography* 4.6.1) that things 'Alpian' (Αβπια) were formerly called 'Albian' (Αλβια).

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important factor in the genesis of *albio*, with a meaning 'land, territory, world'.

River names in 'Alb-', too, are often associated with a divinity, also so named. It is true that the latter, in the form that we have them, seem to be secondary to the former: as in the case of the nymph 'Albunea' associated with the 'Aquae Albulae' or the Greek god 'Alpheios' associated with the river of that name (Pausanius V. 7, 14, 22). However in the former case there is clearly a link with the old one for the Tiber, 'Albulus', and we may well suspect that this, as appropriate to the major river of the area was linked to 'Albanus' as appropriate to the major mountain: and that both relate to the importance of the name 'Alb(a)-' in the local religion of an earlier era. Meanwhile one might suspect a link between Αλιτο and the Αλφιτο which was recorded as the name of an 'ogress' or 'nursery bugbear' and might well have been appropriate to an earlier strata of Greek gods (Chantraine: 67; Pokorny: 29; Graves 1955: 22.g, 2, 52.7; 1948: 67, 366, 434; and see further Part 3). The possibility arises, then, that ultimately it is the divine name function of the element *alb/ph-* that is primary, even if there has often been a long history of evolution and interaction between divine names and hydronyms/ oronyms that obscures this.

Moving back to Gaul, in addition to 'Albiorix', there are some other divine names or 'epithets', with 'Albio-' or 'Alb-', (thus 'Albarinus', 'Albocelo': Evans: 303, Whatmough: §82; Holder: 86) where these might represent an originally non-Latin element. They include an 'Albius' from Lugdunensis, paired with a 'Damona', associated with springs (Duval: 88, 58). It has been suggested (Whatmough: § 181) that this name might be an alternative epithet to 'Loucetios' or 'Candidus' (= 'white/bright'). However if this represents a non-Latin form, we might have a name directly equivalent to our hypothesised 'Albios' behind 'Alban' and whose divine name function was quite deeply rooted in local tradition along the lines we have suggested, above.

That this was true of the element *alb-*, in general, seems likely in the other linguistic contexts we have examined above and especially clear in the Germanic. Divine names from Roman 'Germania' include the 'Albiahenae' ('matronae'), clearly associated (like 'Albiorix) with a local place-name, (0ber-)Elvenich, probably from 'Albiniacum' (Whatmough §223, Holder: I,79; De Vries 1956/7: 523)

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while Tacitus mentions a semi-divine prophetess, 'Albruna' (vulgar Latin 'Aurinia'; *Germania* 8). More significantly we have already noted, above, the likely link between the German river name, 'Albis', for the Elbe, and Germanic words meaning ghost or evil spirit. Associated with the latter and incorporating the root *alb-* > *alf-* are the spiritual or demonic beings from the Germanic world, which are represented in modern English by the word, 'elf' (De Vries: § 170, 184, cf. 214). The root *alb-* is also found in the names of 'mythical' individuals of this type, like 'Alberich the dwarf' in the *Nibelungenlied* (verses 96-8). These beings might seem likely to represent an earlier stratum of 'faded' deities so that 'Alb-' will have occupied a similar place in the religion of early Germany to the one we have suggested for Latium and Greece. It is worth bearing in mind that words meaning 'light' or 'bright' have become the names of important deities like 'Lugus' (Jackson 1953: 441; Evans: 219), or 'Zeus' and 'Jupiter' and the whole family of related theonyms in *dyew-* (Frazer: ch. XVI; Meillet 170-1, 174-5, 328, 329). It is possible to see names in 'Alb-' as representing an earlier generation of gods whose names were derived in a parallel way, although in this case perhaps more unequivocally 'solar'. The Germanic 'elves', at any rate, are often regarded as having 'solar' attributes: the sun was sometimes called *alfroðull*, 'ray of the elves' (Turville-Petre: 231; Davidson: 156: otherwise "la gloire des Alfes" or "roue des Alfes": Haudry: 193; 216, note 216). Meanwhile we have already explored the solar associations of St. Alban, Ailbe, and even Albio-rix. Alongside this is the archaeological evidence which might seem to support the idea of the dominance of gods with solar attributes in pre-historic Europe (e.g. Green 1991).

However, the most important piece of evidence that the association of names in 'Alb-' with divinities goes back a long way in the Indo-European tradition, comes from the Rig Veda. This mentions semi-divine beings called 'Ṛbhus' who have characteristics strikingly reminiscent of those of the Germanic 'elves' (or of the 'dwarves', closely related to them), while their name appears to be etymologically very closely equivalent (De Vries II, p.258, note 2;

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Macdonnel 1897: 131-4). Other etymologies have been proposed[34] but the correspondences between 'Ṛbhus' and Germanic 'elves' are far too striking to ignore. Ṛbhus were of 'sun-like appearance' and had other solar attributes: in fact Haudre (1987; followed by Adams/Mallory) has convincingly argued that their primary association was with the yearly cycle, and the rejuvenating, life-giving power of the sun. He goes on to suggest a cose relationship with Germanic elves, of matching asssociations. The likelihood would seem to be, then, that both elves and Ṛbhus stem from a tradition that dates back to the separation of the Indian from the Germanic (and many other) branches of the Indo-European family.[35] In fact *Ṛbhu* would be from *h₂lbh-*, as the zero grade of a root *h₂elbh-* that also stands behind the full grade (*h₂elbh-*), from which the *albh-o-* behind *alfr, albus* etc.. derives. Therefore our common prototype with divine-solar associations would date back to the early period before the vowel-diversification by 'ablaut' in Proto-Indo-European. It is important for us to recognise that the association of the element *albho-* with the names of divine - or semi-divine - beings has such a long and deep rooted tradition. This is obviously a pertinent consideration when we consider whether the name of our martyr represents a continuation of this tradition.

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[34] E.g. from a root *rabh/labh*, 'to grasp' because it would seem to explain their association with dexterity and the ability to fashion wonderful things (Pokorny 1959: 652). However if we have a case of assimilation of an ancient theonym to this similar sounding word, it might also explain why the elf-related 'dwarves' have similar associations. For the close relationship between elves and dwarves: Turville Petre: 235 : "If they are not of the same origin, dwarves are hard to distinguish from the dark or black elves...." (Haudry's attempt to draw a firm distinction between 'white elves' and 'dwarves/black elves' might be doubted). On the other hand other figures associated with fire (for Rbhus and fire; Haudre 186-8) and solar heat are the blacksmiths or creative geniuses (à la Hephaistos) of the divine world.

[35] A cognate that perhaps takes us back to an even earlier split in the Indo-European languages is Hittite *alpas*, 'a cloud': e.g. Pokorny 1959: 31. Puhvel (37-8), however, notes that "the dominant Hittite associations of clouds with rain and thunder do not advocate whiteness": cf. the alternative etymology offered by Cop: *Ziva Antika* 3 (1953) p.193. If the *alpas* connection is correct it might (by a minority view) point to a root *h4elbh-*, rather than *h2elbh-2*.

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Abbreviations

ASS : *Acta Sanctorum* of the Bollandists;
BBCS : *Bulletin for the Board of Celtic Studies;*
CMCS : *Cambridge Medieval Celtic Studies;*
DIAS : Dublin Institute for Advanced Studies;
DIL : *Dictionary of the Irish Language*, Royal Irish Academy 1942-76
GPC : *Geiriadur Profysgol Cymru*, Aberystwyth, 1950-
UWP : University of Wales Press.

References

Adams, D.Q and Mallory, J.P
1997 *Encyclopedia of Indo-European Culture*, London/Chicago: Fitzroy Dearborn.
Barruol, Guy
1963 "Mars Nabelcus et Mars Albiorix" in *Ogam* 15.
Bartrum, P.C.
1966 *Early Welsh Genealogical Tracts*, Cardiff: UWP.
Berthelot , A.
1934 *The 'Ora Maritima' of Avienus*, ed., Paris.
Bertoldi, Vittorio
1931 "Problemes de Substrat", *Bulletin de la Societe Linguistique* 96, pp. 93-184.
Chadwick, Nora
1955 *Poetry and Letters in Early Christian Gaul*, London.
Chantraine, P
1983 *Dictionnaire Étymologique de la Langue Grecque*, Paris: Klincksick.
Conway, R.S., Whatmough, J. and Johnson, S.E.
1933 *The Prae-Italic Dialects of Italy*.
Cross, T.P. and Slover, C.H.
1936 *Ancient Irish Tales*, New York.
Dark, K.R.
1994 *From Civitas to Kingdom,* London/New York: Leicester University Press.
Dauzat, Albert
1960 *La Toponymie Francaise*, Paris: Klincksick.
1963 *Dictionnaire Étymologique des Noms de Lieux en France*, Paris

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Dauzat, A., Deslandes, G. and Rostaing, C.
1978 *Dictionnaire Étymologique des Noms de Rivières et de Montagnes en France*, Paris: Klincksiek.
Davidson, H.R. Ellis
1964 *Gods and Myths of Northern Europe*, Pelican.
Delehaye, Hippolyte
1931 *Commentarius in Martyrologium Hieronymianum*, ASS Novembris ii, 2.
1931b "In Brittania dans le Martyrologe Hieronymien" in *Proceedings of The British Academy* 17.
1933 *Les Origines des Cultes des Martyrs*, 2nd ed., [Subsidia Hagiographica 20], Brussels.
De Vries, Jan
1956-7 *Altgermanische Religions-geschichte*, Berlin.
1977 *Altnordisches etymologisches Wörterbuch*, Leiden.
De Paor, Liam
1993 *Saint Patrick's World*, Dublin: Four Courts Press.
Dooley, Anne and Roe, Harry
1999 *Tales of the Elders of Ireland*, Oxford university Press.
Duchesne, Guillemin
1894 (Bern, Epternach and other rescensions of Mart.H.) in *ASS* Novembris ii, 1.
1907-15 *Fastes Épiscopaux de l'ancienne Gaule*,2nd ed., 3 vols, Paris.
Dumville, D.
1984a "Gildas and Uinniau" in M. Lapidge and Dumville, eds, *Gildas New Approaches,* Woodbridge: Boydell Press.
Duval, Paul-Marie
1976 *Les Dieux de la Gaule*, 2nd ed., Paris.
Evans, Ellis
1967 *Gaulish Personal Names*, Oxford: Clarendon Press.
Ewig, E.
1978 "Bemerkungen zur Vita des Bischofs Lupus von Troyes", pp. 14-26 in *Geschichschreibung und geistiges Leben im Mittelalter. Festschrift fur Heinz Lowe* zum 65. Geburstag, ed. K Hauk, J. Mordek, Cologne.
Fleuriot, Léon
1964 *Le Vieux Bretonne: éléments d'une grammaire*, Paris: Klincksiek.
Frazer, Sir James
1922 *The Golden Bough*
Frere, S.S.
1983 *Verulamium Excavations II*, [Society of Antiquaries Research

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Report XLI], London.
Grandgent, C.H.
1907 *An Introduction to Vulgar Latin*, Boston.
Graves, Robert
1948 *The White Goddess*, Lodon: Faber & Faber.
1955 *The Greek Myths*, 2 vols, Penguin.
Green, Miranda
1991 *The Sun-Gods of Ancient Europe*, London: Batsford.
Griffe, E.
1964-66 *La Gaule Chrétiennne à l'Époque Romaine*, 2nd ed., 3 vols, Paris.
Guyonvarc'h, Christian-J
1959 "Notes d'etymologie et de lexicographie Celtiques et Gauloises" in *Ogam* XI, 437-40.
Hamp, E.P.
1960 "Pre-Romance Alpes and *Kurro-" in *Romance Philology* 13.
1982/3 Comments on Notes to Armes Prydein" in *BBCS* 30, p.291.
1986 "Varia 5" in *Etudes Celtiques* 23, pp. 87-9.
"Welsh elfydd and albio-" in *BBCS* 36, pp. 109-10.
1992 "Welsh elfydd and albio-" in *Zeitschrift für Celtische Philologie* 45, pp. 87-9.
Haudry, Jean
1987 "Les Ṛbhus et les Alfes", *Bulletin d'etudes Indiennes* 5, pp.159-219
Hawkes, C.F.C.
1977 *Pytheas: Europe and the Greek explorers*, [the 8th J.L. Myres Memorial Lecture], Oxford.
Heist W.W.
1965 *Vitae Sanctorum Hiberniae ex codice olim Salmantacensis*, ed., Brussels.
Higham, Nicholas
1992 *Rome, Britain and the Anglo-Saxons*, London: Seaby.
Holder, A.
1896-1907 *Alt-Celtischer Sprachschatz*, 3 vols, Leipzig: Teubner.
Hubschmid, Johannes
1951 *Alpenwörter romanischen und vorromanischen Ursprungs*, Berne: Francke.
Jackson, Kenneth. H
1948 "On Some Romano-British Place Names" in the *Journal of Roman Studies* 38.
1953 *Language and History in Early Britain*, Edinburgh.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Jones, A.H.M.
1966 *The Decline of the Ancient World*, London/New York: Longman.
Jullian, C.
1908-26 *Histoire de la Gaule*, 8 vols, Paris: A. Colin.
Kenney J.F.
Sources for the Early History of Ireland: Vol 1, Ecclesiastical, Columbia (reprinted New York 1966).
Koch, John.T.
"Bran, Brennos: An Instance of Early Gallo-Brittonic History and Mythology", *CMCS* 20, 1-20.
Krahe, H
1955 *Die Sprache der Illyrier*, Wiesbaden.
Krusch. B
1920 Vita Lupi, ed., in *Monumenta Germaniae Historica, Scriptores Rerum Merovingicarum* VII, pp. 295-302.
Lebel, P.
1939 "Les Noms de rivieres de la Gaule chez l'Anonyme de Ravenne", *Revue des Etudes Anciennes* 41, pp. 126-7.
Levison, Willhelm
1920 Vita Germani, ed., in Krusch, ed., *MGII, SRM* VII.
1941 "St. Alban and St. Albans" in *Antiquity* 15, pp. 337-59.
Loth, Joseph
1910 *Les Noms des Saints Bretons*, Paris: Honoré Champion.
Lowe, W.R.L.
1914-15 Pp.58-67 in *Proceedings of the Society of Antiquaruies of London*, 2nd Ser., vol 27.
Lunt, W.E.
1926 *The Valuation of Norwich*, ed., Oxford: Clarendon Press.
MacCana, Proinsias
1958 *Branwen, Daughter of Llyr*, Cardiff: UWP
Macdonnel, A.A.
1897 *Vedic Mythology*, Strassburg.
Markus, R.A.
1986 "Pelagianism: Britain and the Continent" in the *Journal of Ecclesiastical Studies* 37, pp.191-204.
Mathisen, Ralph. W.
1999 *Ruricius of Limoges and Friends*, Liverpool University Press.
Meid, Wolfgang
"Uber Albion, elfydd, Albiorix, und andere Indikatoren eine keltischen Weltbildes" in M.J. Ball, J,Fife, E,Poppe and J.Rowland, ed. *Celtic Linguistics: Readings in the Brythonic*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Languages, Festschrift for T.Arwyn Watkins, Amsterdam/ Philadelphia.

Meillet, A and Ernoult, A.
1967 *Dictionnaire Étymologique de la Langue Latine*, 4th ed., Paris:Klincksiek.

Meyer, Kuno and Knut, Alfred
1895 *The Voyage of Bran, son of Febal*, ed. & trans., London.

Meyer, W.
1904 "Passio Albani" (Turin and Paris Texts, pp. 35-47) ed.., in *Die Legende des h. Albanus, des Protomartyr Angliae, in Texten vor Beda.*

Morris, John
1977 *The Age of Arthur*, London/Chichester: Phillimore.
1980 *Nennius* (Historia Britonum ed. and trans.), Phillimore.

Myers J.N.L.
1960 "Pelagius and the End of Roman Rule in Britain" in *the Journal of Roman Studies* 50, pp. 21-36.

O'Rahilly, T,F.
1946 *Early Irish History and Mythology*, DIAS..

O'Riain, Padraig
1977 "St. Finbar: a study in a cult" in the *Transactions of the Cork Historical and Archaeological Society* 82, pp. 63-82.

Pierce, G.O.
1968 *The Place Names of the Dinas Powys Hundred*, Cardiff: UWP.

Pokorny, Julius
1959 *Indogermanisches Etymologisches Wörterbuch*, 2vols, Berne and Munich: Francke.

Puhvel, Jaan
1984 *A Hittite Etymological Dictionary*, (Vol. 1), Berlin: Mouton.

Rivet, A.L.F. and Smith, C.
1979 *The Place Names of Roman Britain*, London: Batsford.

Rostaing, Charles
1950 *Essai sur la Toponymie de Provence*, Paris.

Russel, Paul
1985 "A Footnote to Spirantization", *CMCS* 10, 53-6.
1990 *Celtic Word Formation: the Velar Suffixes*, DIAS.
1995 *Celtic Languages*, London/New York: Longman.

Salway, Peter
1981 *Roman Britain*, Oxford: Clarendon Press.

Schmidt, Karl Horst
1997 "Celtic Movements in the First Millenium B.C." in the *Journal*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

of Indo-European Studies 20, pp. 145-78.

Selmer, Carl
1959 *Navigatio Sancti Brendani Abbatis*, ed., Notre Dame, Indiana.

Sharpe, Richard
1991 *Lives Medieval Irish Saints'*, Oxford: Clarendon Press.

Sims-Williams, Patrick
1983 "Gildas and the Anglo-Saxons", in *CMCS* 6 pp.1-30
1990 "Dating the Transition to Neo-Brittonic: Phonology and History, 400 to 600" in A Bammesberger, A. Wollman, ed., *Britain 400 to 600: Language and History*, Heidelberg: Winter.

Stokes, Whitley
1888 "Imram Maelduin", ed. & trans., in *Revue Celtique* 9.
1890 *Lives of Irish Saints from the Book of Lismore*, Oxford: Clarendon Press.

Thomas, Charles
1981 *Christianity in Roman Britain to A.D. 500*, London: Batsford.

Thompson, E.A.
1984 *St. Germanus of Auxerre and the End of Roman Britain*, Woodbridge: Boydell Press

Thornhill, P
1999 "The British Martyrs Aaron and Julius" in *The Mankind Quarterly* 39, pp. 467-507.

Thurneysen, Rudolf
1946 *A Grammar of Old Irish*, DIAS.

Turville-Petre, E.O.G.
1964 *Myth and Religion of the North*, London.

Vendryes, J
1951 "Sur le traitement brittonique de i en hiatus", *Bulletin de la Societé Linguistique de Paris* 47, pp. 1-10.

Watson, W.J.
1926 *The Celtic Place Names of Scotland*, Edinbugh/London.

Whatmough, Joshua
1970 *The Dialects of Ancient Gaul*, Cambridge, Mass.: Harvard University Press.

Wheeler, R.E.Mortimer
1935 *London and the Saxons*.

Williams, Sir Ifor
1931-3 *BBCS* 6, p.134.

Winterbottom, Michael
1978 *Gildas, the Ruin of Britain*, text & trans., London/Chichester: Phillimore.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Wood, Ian
1984 "The End of Roman Britain: Continental Evidence and Parallels" in M. Lapidge and Dumville, ed., *Gildas New Approaches*, Woodbridge: Boydell Press.

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Where is the Human Baculum?

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Humans are unique among the primates in many characteristics, especially the primary and secondary sexual characters. One of these characteristics is that human males are the only member of the old world simian group (apes and old world monkeys) without a baculum. The loss of this bone in *Homo sapiens* is considered with respect to its function and appearance in other hominids. It is hypothesized that its loss in humans is related to upright posture, mating systems, and sperm competition. I predict that as more fossils are discovered or bones associated with current collections reexamined, all hominids before, and possibly including *Homo erectus* will be found to possess a baculum.

Keywords: human mating systems, penis, sperm competition, bacula, human evolution

1. Introduction

Modern man is anatomically unique amongst his near relatives the primates, most obviously in being hairless, erect and wholly bipedal. Sexual characters are especially different in *Homo sapiens* (Short, 1981) and can be divided into two categories, primary and secondary. Primary characters are those directly related to copulation and are formed early in development. These include the organs of gamete transfer, as well as grasping appendages to secure the female. Secondary sexual characteristics, which become evident during puberty and adulthood, have received more attention, usually under the term sexual selection (Darwin, 1871; Trivers, 1972).

Humans are distinctly different from other primates with regard to several primary sexual characters, including concealed ovulation (Benshoof and Thornhill, 1979; Alexander and Noonan, 1979; Burley, 1979; Smith, 1984, but see Sillen-Tullberg and Moller, 1993), possession of a hymen (Burley, 1979; Katchadorian, 1990; Hobday et

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al., in press), and permanent breasts (Short, 1980; Cant, 1981; Smith, 1984; Caro, 1987). An additional difference is that the human penis lacks a baculum (Hill, 1972; Short, 1979). In this paper I shall first explain the form and function of both bacula and penis and summarize likely functions, offer a possible explanation for the enlargement of the penis and loss of the baculum in H. sapiens, and finally consider some comparative evidence to support my hypothesis.

2. The Baculum

What is a Baculum?.

The baculum (also called a penis bone, os priapi, or os penis) is a heterotypic bone present in the penis of various male mammals. Morphologically it is the most diverse of all bones and is often elongated. The distal end is complex in shape with great interspecific variability, implying that it has been subject to much selection (Eberhard, 1985; Dixson, 1987a, b; Fooden 1988). A female counterpart, the os clitordoris or baubellum, is present in some species (Hershkovitz, 1977; Hancox, 1987; Williams-Ashman and Reddi, 1991). Both form from ossification of the mesenchyme tissues within the organ. Because bacula growth occurs with maturity, it has been used to age males of some species (Hancox, 1987; Chen et. al., 1988).

A baculum is found in 6 orders of Eutherian mammals (Table 1). It may have evolved separately in each mammal order in which it occurs (Hershkovitz ,1977). Of the non-primate orders, only in the Carnivore family Hyeniidae is the baculum absent. In the primates it is found in all the Catyrrhini (Hill, 1972), all prosimians but Tarsius, while in the Platyrrhini it is absent in several genera belonging to different families (Ateles, Lagothrix, Alouatta and some specimens of Chiropotes and Cacajao) (Hershkovitz, 1977; Dixson, 1987a, b). Among the apes and old world monkeys, H. sapiens is the only member without a baculum (Table 1). These species are considered the most specialized members of their respective groups, and the lack of bacula is considered degenerative (Hershkovitz, 1977).

In species with a baculum it is often a major element of the penis, and so it is logical to first consider the function of the penis. The primary function of the penis is to transfer sperm to the female reproductive tract. It may also be used for threat or mating displays, and perhaps to enhance female sexual stimulation during coitus

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(Smith, 1984; Sheets-Johnstone, 1989). Presumably a larger penis will be advantageous in these behaviors. I will briefly outline the possible uses of a large penis, and argue that the main function in humans is for maximum sperm transfer and mating success.

Humans have been reported as having the largest penis of all primates (Short, 1979; Smith, 1984; Diamond, 1992; Baker and Bellis, 1995), but recent work has suggested that in fact chimpanzees possess a penis of similar or greater length (Dixson and Mundy, 1994) (Table 2). The advantage of large size is important in most of the following suggestions for penis function.

Display behaviors or attributes often play a part in mate attraction, and so penises may be used in some mating situations. Chimpanzees display with erect penises, but other primates with comparatively large penises do not use them for visual displays (e.g. Galago, Macaca) (Dixson and Mundy, 1994; Dixson, 1995). However, Dixson (1987b; Dixson et al. 1994) suggested that elongated penises in chimpanzees are primarily an adaptation to an increase in length of the female reproductive tract as a result of the sexual swellings.

Ancestors of modern humans may also have displayed the genitals to attract females, as do chimps (Sheets-Johnstone, 1989). Even today the male organs are arranged for display (Short, 1980). The flaccid penis is permanently visible, in contrast to the chimp, ape and orang. In further contrast to those species, the pubic hair is not for camouflage, rather, it seems to draw attention to the area (Table 2). Man's erect penis has long been regarded as highly erotic, and is depicted in rock paintings, carvings, sculptures and drawings from many cultures (Katchadorian, 1990). The focus of eroticism however, has shifted in modern humans, such that today it is the external attributes of the female that are most are admired (Short, 1980). In English law, indecent exposure, defined as display of the penis, flaccid or erect, is an exclusively male offense. It cannot be committed by a female, since she has nothing, by law, indecent to expose (Short, 1980). If the penis is for display, flashers should be able to obtain copulations, however modern human females are usually unimpressed by such behavior (Smith, 1984). Sheets-Johnstone (1989) supported the role of the penis in display, arguing that it replaced the vulva of non-hominids as the primary sexual attractant. Currently the act of intercourse between consenting human couples usually takes place in private, and the opportunity to display to other males is slight. Indeed

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open display is now illegal, (perhaps a response by males to prevent other males from attracting their mates).

In humans, penis size is inherited independently of other body traits (Schonfield, 1943) and so any use of the penis in aggression displays raises the possibility of "a shrimp of a man with a large penis chasing off a muscle bound challenger with a smaller pecker" (Short, 1980). Indeed, in agonistic encounters there is no evidence that human males experience erection (Smith, 1984).

Baker and Bellis (1995) recently offered another explanation for the large size of the human penis. They suggest that the straight, piston shaped penis are adapted to remove soft coagulum sperm plugs from the female vagina, through the action of intercourse. The requirment for a snug fit if the piston is to work, also explains the large diameter of the male organ. In addition, the racial differences in penis size are correlated with the differences in birth weight and hence difference in vaginal dimensions (Baker and Bellis 1995, p171). Their hypothesis is also compatible with the following explanation; that increased penis size is related to more efficient sperm transfer following increase in the length of the female vaginal canal.

3. Loss of Human Baculum

As ancestors of H. sapiens evolved towards bipedalism, the 90° angle between the spine and legs of quadrupeds approached 180°, displacing some of the internal organs, especially in females. The female reproductive passage has moved further forward than expected from simply becoming bipedal and has moved inwards in the body cavity, possibly for protection (Morris, 1969). This longer reproductive passage of our female ancestor may have posed a potential problem for the small-penised, rear mounting male (Morris, 1969; Morgan, 1972). Sperm transfer to the mouth of the cervix became somewhat difficult. The change to front-front mating may have reduced some of the shortfall, but to facilitate efficient sperm transfer to the female and subsequent use of the gametes, a longer penis would be an advantage. Selection may have favored a longer organ with a larger supporting baculum. This heavy organ may have been a potential discomfort, as well as increasing vulnerability. A larger body cavity is required if the penis is to be withdrawn for protection or comfort, and such a development may have been constrained by space or musculature. Another option is selection for

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a more vascularized organ, as this capability already exists to some extent in hominoids with bacula. With such selection, the bone is just taking up space, inhibiting maximum elongation during erection and mating, and so penises with a baculum was selected against in favor of those with greater vascular tissue. The evolution of a fully vascular penis with the same support as the bacula provided allowed greater size, better sperm delivery, some protection, and hence greater reproductive success than the baculum equipped rivals. Length should not increase continually however, only until the mean length of the penis equals the mean depth of the vaginal column, as suggested for chimpanzees (Dixson and Mundy, 1994; Dixson, personal communication). In chimps, average erect penis length is less than average vaginal canal depth, suggesting female morphology is equally important in determining intromission depth. Obviously co-evolution of the female reproductive passage has occurred, and recent work has suggested that an increase in the length of the vaginal passage is important in increasing the female's choice of mate by regulating the depth of penetration (Brown et al., 1995; Keller and Reeve 1995).

Penile selection may be very rapid. Eberhard (1985), noting complex penile morphologies in many animals, proposed that specializations of the male genitalia are adaptive, not only for depositing spermatozoa in the female tract, but for ensuring that females will prefer sperm delivered from that penis morph. Small adaptive changes are subject to rapid selection under these conditions, in the same manner as those secondary sexual adornments noted by Darwin (1871). This selection may be very simple genetically if the baculum "gene" is on the Y chromosome, and hence sex-linked, it can react very quickly to sexual selection, as it always haploid. An alternative is that the "gene" is on an autosome with expression controlled by Y-chromosome hormones, i.e. it is sex limited (Short, 1981).

Other factors may have played a role in the loss of the baculum. Sperm competition has been proposed in the evolution of other human characters. Smith (1984) suggested that several distinctive features of the male anatomy are designed to give that male an advantage in competing with other males when attempting to impregnate a female. This suggests that in evolutionary time a male faced the likelihood that his mate would soon copulate with another male, and by depositing more sperm closer to the egg he increased

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the chances that his sperm would provide fertilization. As I shall discuss, the degree of sperm competition has probably varied in human evolution, and acted to favor selection for a penis without a baculum.

Homo sapiens Today

The modern human penis is described as a vascular penis. It is comprised of three spongy cylinders encased in a facial sheath. The three cylinders are the paired corpus carvernosum and a single corpus spongiosum. A fibrous suspensory ligament attaches the hilar portion of the corpora cavernosa to the periosteum of the pubic bone to provide support for the penis (Paick and Lue, 1993). Their is some racial and evolutionary variation in the appearance of this support (Loofs-Wissowa, 1994). The extremely loose penile skin and the subcutaneous connective tissues permit considerable elongation and expansion of the corpora within the coverings. Sexual excitement triggers arterial vasodilatation, resulting in increases in length and diameter of shaft, and sometime thereafter, sperm delivery to the mouth of the uterus (Williams-Ashman and Reddi, 1991). As mentioned earlier, there is no sign of a baculum in modern humans.

Several occurrences of a modern human penis bone, however, have been noted in the medical literature (Sarma and Weilbacher, 1990). In some of these cases a bone in the penis was related to some trauma, following which in the repair process bone was deposited. These can not be considered true baculum, and even impaired normal sexual function. A single congenital case has been reported, in 1964 a penis bone was removed from a five year old cleft palate male. These occurrences are unlikely to be phlylogenetic vestiges because they are larger than the bacula found in apes.

When did Man lose it?

The hominoid line diverged from the old world primates (Cercopithecidea) in the Miocene, 25-27 million years ago. The orang line branched 13 million years ago (Pilbeam, 1985; Andrews, 1986), followed by the gorilla 7-8 million years (Horai et al., 1992), and finally the chimp-hominid divergence four to five million years ago (Hasegawa and Kishino, 1991; Horai et al., 1992; Stoneking, 1994, but see Gingerich, 1985). The branching dates differ slightly depending on the molecular clock used (Gingerich, 1985; Hasegawa and Kishino,

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1991). In all these groups but the hominids, the baculum is present, implying that the chimp-hominid ancestor had a baculum. The last member of the hominoid lineage to possess a baculum is unknown. As mentioned, the baculum is a small bone, and thus may not be preserved at all, in addition fossil hominid skeletons are usually fragmented and incomplete. Just one case of a fossil baculum from an extinct primate has been reported (von Koenigswald, 1979, in Dixson, 1987a). Fossils of living African apes are virtually unknown (Gingerich, 1985), and so we cannot look for information about the preservation of bacula there either. Finally, in reconstructing our ancestors' skeletons, comparisons are made to modern humans. The baculum, if it occurred and was recovered, may simply not be recognized, especially if the bones of other animals are also present.

I now consider the evolution of the penis and baculum in the hominid line (Table 3). Much of this argument follows discussions on the evolution of human testes (Short 1979, 1980, 1981; Harvey and Harcourt, 1984; Smith, 1984). The information on potential mating systems has been taken mainly from Benshoof and Thornhill (1979).

Australopithecine's were sexually dimorphic, and probably resembled the gorilla in both foraging and mating systems, with one dominant male and several females forming a group. There is little evidence to suggest that they were meat eaters, and there was plenty of plant food available for both sexes (Benshoof and Thornhill, 1979). Because of this the dominant male could control sexual access to several females, and had little to fear in the way of sperm competition. I predict that the Australopithecine penis was a small, gorilla-like organ, with a baculum (Table 3).

Two subsequent developments, intergroup competition and sharing of scarce high quality food, probably destabilized the single male dominance, increased sperm competition, and influenced the development of an elongated penis. The sharing of high quality food was probably important in increasing female promiscuity, and allowed male-female bartering for sex.

Fossil evidence suggests that *Homo habilis* was probably a scavenger of carcasses as much as a big game hunter (Diamond, 1992). This was a dangerous activity, involving competition against other scavenging animals and defense of finds. This may have precluded pregnant and nursing females from similar foraging, and signaled the beginning of division of labor. The prime food, meat, was

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now directly unavailable for females, while subordinate males could offer this rare resource to females in the group in exchange for sex. This behavior also required that the dominant male leave his females while scavenging. Females thus had opportunity for other liaisons, resulting in increased sperm competition. At this time a longer penis would have been favored, while the baculum had probably not been completely lost, as it may be important in multiple matings (Table 3).

Homo erectus appears to have been a successful group hunter, where male-male co-operation was essential (Benshoof and Thornhill, 1979). Each male probably had access to food and females, as do modern chimpanzees. Intensified sperm competition followed this reduced male-male conflict. My speculation is a longer chimp-like penis, perhaps with the baculum persisting for support in multiple matings (Table 3).

This pattern of male cooperation with multiple mating resulted in less surety of parentage for males. Subsequent development in tools and hunting strategies meant more meat was available and each male could provide for a female's needs. Once again, males could control access to females and a time of reduced sperm competition occurred. Now the male guarded his female from other males. This is perhaps when the evolution of permanent breasts and concealed ovulation occurred, as females attempted to achieve some of the advantages of facultative polyandry and reproduction (Benshoof and Thornhill, 1979; Burley, 1979). Even though competition was reduced, extra-pair couplings could still occur, favoring continuing penis evolution toward efficient sperm delivery. A reduced baculum has been shown to be associated with a lower degree of sperm competition (Dixson, 1987b; Verrell, 1992).

In the recent past, as monogamy (or polygamy) developed in humans, the requirement for multiple matings decreased. Males could still not "trust" females, however (e.g. the good sons effect, Burley, 1979), and it was to the advantage of each male to deliver sperm close to the site of fertilization as efficiently as possible (or remove the sperm of other males (Baker and Bellis, 1995)). While human sperm can survive for only 10-12 hours in the acidic vaginal canal (Vander Vliet and Hafez, 1974) they remain fertile for up to 5 days within the cervix (Barrett and Marshall, 1969, in Baker and Bellis, 1993). Thus effective fertilization is important in order to overcome sperm competition from both earlier and later matings. Indeed it was

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recently reported that sperm competition has the potential to occur even in modern humans (Baker and Bellis, 1990, 1993a, b).

The human vascular penis as it now operates is good for one ejaculation, then a recovery period is required. The inability to perform intercourse many times in succession may reduce the potential fitness of male primates in 'open' mating systems, but in a system where a single male can control access to one or more females this is probably not a concern.

Comparative Evidence

The role of the penis-baculum combination in other animals may lend some insights into its loss in H sapiens. In primates, carnivores and pinnipeds an elongated baculum is associated with a prolonged single intromission copulatory pattern (Dixson, 1987a, b, 1995). In such activities the baculum may serve to protect and strengthen the penis during intromission (Fooden, 1988) and protect the urethra from compression in the prolonged intromission. Prolonged intromission has been hypothesized as form of mate guarding (Dixson, 1991, 1995).

Other suggestions for the baculum include assisting with sperm transfer to the female tract, as in some species it projects beyond the end of the penis and may contact the os cervix during copulation. In induced ovulators (e.g. mustelids) the baculum may induce ovulation via contact with the cervix, but there are both induced ovulators without bacula, and spontaneous ovulators with bacula (Dixson, 1995).

The relatively small size of the chimpanzee baculum, together with its large penis size, suggests that as in *Homo*, reduction may be associated with an increase in penis size to match the increased length of the female vaginal canal (Dixson and Mundy, 1994).

As mentioned earlier, several genera of new world monkeys are without bacula. Examination of the social systems of these species yields no clear insights to the human situation. They do not fall into any single category of mating strategy, or lifestyle. There exist baculum-less species with both low (Tarsius) and high (Ateles) sperm competition (Smuts et. al., 1987; Hershkovitz, 1993; Gursky, 1994; A. F. Dixson personal communication). Reduction in the bacula of the new world monkey family Pitheciine (perhaps including loss in Cacajao, and Chiropotes) has been attributed to development of a

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unique system of sperm delivery within the group (Hershkovitz, 1993). Hershkovitz (1977, 1993) also notes that the loss of bacula in *Homo*, Tarsius, and the Pithecines, is correlated with symmetrical glans in the tip of the penis. In many primates the urinary meatus is deflected to the right, with the large left lobe of the glans penis containing the bacula. In fact, in all primates with asymmetrical glans, it is the left lobe that is larger (Hershkovitz, 1977). Perhaps symmetry provides the necessary rigidity provided by the baculum in non-symmetrical penises, or is not possible when the baculum lies in one of the glans. Symmetry may allow for better insertion and fit of the penis in the uterus of Pitheciines (Hershkovitz, 1993), although this copulation strategy is not employed by *Homo*. Despite loss of the bacula, Ateles maintains asymmetry in the glans (Hershkovitz, 1977, 1993). This symmetry that often accompanies loss of the bacula may allow a more efficent piston-style penis, better able to remove sperm plugs (Baker and Bellis, 1995). The significance of glans symmetry-asymmetry should be a focus for future research on baculum reduction.

4. Conclusion

Homo sapiens has no baculum, which is unique among the hominoids. I have proposed that this is due to selection favoring a larger penis following the evolution of upright posture, increase in vaginal canal length, and subsequent sperm competition resulting from changing foraging patterns and mating systems. The need for efficient sperm transfer, initially resulting from a mismatch in the transition to bipedalism, was further intensified by male competition for females before hunting and cooperation allowed each male to again control access to one or more females. This progression favored selection for elongated penises and loss of the baculum, perhaps in *Homo erectus*. I predict that as more fossils are discovered, or when present collections are reexamined, all hominids before, and possibly including, H. erectus will be found to have a baculum.

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References

Alexander RD, Noonan KM (1979) Concealment of Ovulation, Parental Care, and Human Social Evolution. In Chagnon N, Irons W (eds): Evolutionary Biology and Human Social Behavior. Massachusetts: Duxbury Press , pp 436-453.

Andrews P (1986) Fossil evidence on human origins and dispersal. Cold Spring Harbor Symposium on Quantitative Biology. 51: 419-428.

Baker RR, Bellis MA (1993a) Human sperm competition: ejaculate adjustment by males and the function of masturbation. Animal Behav. 46: 861-885

Baker RR, Bellis MA (1993b) Human sperm competition: ejaculate manipulation by females and a function for the female orgasm. Animal Behav. 46: 887-909

Baker RR, Bellis MA (1995) Human Sperm Competition: Copulation, Masturbation and Infidelity. London: Chapman and Hall.

Bellis MA, Baker RR (1990) Do females promote sperm competition? Data for humans. Animal Behav. 40: 997-999.

Benshoof L, Thornhill R (1979) The evolution of monogamy and concealed ovulation in humans. J. Soc. Biol. Struct. 2: 95-106.

Brown L, Shumaker RW, Downhower JF, (1995) Do primates experience sperm competition? Am. Nat. 146: 302-306.

Cant JGH. (1981) Hypothesis for the evolution of human breasts and buttocks. Am. Nat. 117: 199-204.

Caro TM (1987) Human breasts: Unsupported hypotheses reviewed. Human Evol. 2: 271-282.

Chen R, Dong Z, Yang C (1988) On using baculum to determine the age of male Norway rat. Acta Theriologica Sinica. 8: 288-293.

Darwin C (1871) The descent of man and selection in relation to sex. London: Murray.

Diamond JM (1992) The third chimpanzee; the evolution and future of the human animal. New York : HarperCollins Publishers Inc.

Dixson AF (1987a) Baculum length and copulatory behavior in Primates. Am. J. Prim. 13: 51-60.

Dixson AF (1987b) Observations on the evolution of the genitalia and copulatory behavior in male primates. J. Zool. 213: 423-443.

Dixson AF (1991) Sexual selection, natural selection and copulatory patterns in male primates. Folia Primatologica. 57: 96-101.

Dixson AF, Mundy NI (1994) Sexual behavior, sexual swelling, and penile evolution in chimpanzees (Pan troglodytes). Arch. Sex. Behav. 23: 267-280.

Dixson AF (1995) Baculum length and copulatory behavior in carnivores and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

pinnipeds (Grand Order Ferae). J. Zool. 235: 67-76.
Eberhard WG (1985) Sexual selection and animal genitalia. Cambridge: Harvard University Press.
Fisher HE (1989) Evolution of Human Serial Pairbonding. Am. J. Phys. Anthrop. 78: 331-354.
Fooden J (1988) Taxonomy and Evolution of the Sinica Group of Macaques: 6. Interspecific comparisons and synthesis. Fieldiana. 45: 1-44.
Gingerich P (1985) Nonlinear molecular clocks and ape-human divergence times. In Tobias PV (ed): Hominid Evolution: Past Present and Future,. New York: Alan R. Liss, pp 411-416.
Gursky SL (1994) Infant care in the Spectral Tarsier (Tarsius spectrum) Sulawesi, Indonesia. Int. J Primat. 15: 843-853.
Hancox M (1987) Baculum use in age determination in the Eurasian Badger. Mammalia. 51: 622-625.
Hardy A (1960) Was Man more aquatic in the past? The New Scientist, March: 642-645.
Harvey PH, Harcourt AH, (1984) Sperm competition, testes size, and breeding system in primates. In Smith RL (ed): Sperm competition and the evolution of animal mating systems. New York : Academic Press, pp 589-600.
Hasegawa M, Kishino H, (1991) DNA sequence analysis and evolution of Hominoidea. In Kimura M, Takahata N (eds): New Aspects of the Genetics of Molecular Evolution. Berlin: Springer Verlag. pp 303-317.
Hershkovitz P (1977) Living New World Monkeys (Platyrrhini). Chicago: The University of Chicago Press.
Hershkovitz P (1993) Male external genitalia of non-prehensile tailed South American Monkeys. Part 1. Subfamily Pitheciinae, Family Cebidae. Fieldiana. 73: 1-17.
Hill W,C.O (1972) Evolutionary Biology of the Primates. New York: Academic Press.
Hobday A.J., Haury L, Dayton PK (in press) Function of the Human Hymen. Medical Hypotheses.
Horai S, Satta Y, Kondo R, Inoue T, Ishida T, Hayashi S, Takahata N (1992) Man's place in Hominoidea revealed by mitochondrial DNA genealogy. J. Mol. Evol. 35: 32-43.
Katchadorian HA (1990) Biological aspects of human sexuality, 4th edition. Fort Worth, Texas: Holt, Rinehart and Winston, Inc.
Keller L, Reeve HK (1995) Why do females mate with multiple males? The sexually selected sperm hypothesis. Advances in the Study of Behavior. 24: 291-315.
Loofs-Wissowa H (1994) The penis rectus as a Marker in Human Paleontology. Hum. Evol., 9: 343-356.
Morgan E (1972) The Descent of Woman. London: Souvenir Press.
Morris D (1969) The Naked Ape. New York: Dell Publishing Company.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Paick K, Lue TF (1993) The Penis. In Hashmat AI, and S. Das S (eds): The Penis. Philadelphia: Lea and Febiger, pp 420-430.

Pilbeam D (1985) Patterns of Hominid Evolution. In Delson E (ed): Ancestors: The Hard Evidence. New York: Alan R. Liss, pp 51-59.

Sarma DP, Weilbacher TG (1990) Human baculum. Urology. 35: 349-350.

Schonfield WA (1943) Primary and secondary sexual characteristics. Study of their development in males from birth through maturity , with biometric study of penis and testes. Am. J. Dis. Child. 65:535-549.

Sheets-Johnstone M (1989) Hominid Bipedality and Sexual-Selection Theory. Evol. Theory. 9: 57-70.

Short RV (1979) Sexual selection and its component parts, somatic and genital selection, as illustrated by man and the great apes. Advances in the Study of Behavior. 9: 131-158.

Short RV (1980) The origins of human sexuality. In Short RV (ed): Reproduction in Mammals, Book 8, Human Sexuality. Cambridge: Cambridge University Press, pp 1-33.

Short RV (1981) Sexual Selection in Man and the Great Apes. In Graham CE (ed): Reproductive Biology of the Great Apes: Comparitive and Biomedical Perspectives. New York: Academic Press, pp 319-341.

Sillen-Tullberg B, Moller AP (1993) The relationship between concealed ovulation and mating systems in anthropoid primates: a phylogenetic analysis. Am Nat. 141: 1-25.

Smith RL (1984) Human sperm competition. In Smith RL (ed): Sperm competition and the evolution of animal mating systems. New York: Academic Press, pp 601-659.

Smuts BB, Cheney DL, Seyfarth RM, Wrangham RW, Struhsaker TT (1987) Primate Societies. Chicago: University of Chicago Press.

Stoneking M (1994) Mitochondrial DNA and Human Evolution. J. Bioenergetics Biomembranes, 26: 251-259.

Trivers RL (1972) Parental investment and sexual selection. In Campbell B (ed): Sexual Selection and the Descent of Man 1871-1971. Chicago: Aldine, pp 136-179.

Vander-Vliet WL, Hafez ESE (1974) Survival and aging of spermatozoa; a review. Am. J. Obst. Gyn. 118:1006-1105.

Verrell PA (1992) Primate penile morphologies and social systems: further evidence for an association. Folia Primatologica. 59: 114-120.

Williams-Ashman HG, Reddi AH (1991) Differentiation of mesenchymal tissues during phallic morphogenesis with emphasis on the baculum: roles of androgens and other regulatory agents. J. Steroid Biochem. Mol. Biol. 39: 873-881.

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Table 1.

Presence of a baculum (in bold) in Eutherian mammals. Information from Dixson (1987b, 1995), with primate classification derived from Smuts et al. (1987). The primate genera without a baculum are listed within the appropriate family.

Class Mammalia
- **Order Pinnipedia** (seals)
- **Order Rodentia** (rodents)
- **Order Insectivora** (moles and shrews)
- **Order Chiroptera** (bats)
- **Order Cetacea** (whales and dolphins)
- Order Carnivora
  - **Family Ursidae** (bears)
  - **Family Canidae** (wolves, dogs)
  - **Family Mustelidae** (weasels, stoats)
  - **Family Felidae** (cats)
  - Family Hyeniidae (hyenas)
- Order Primate
  - **Suborder Prosimii** (38 species)
    - **Family Daubentoniidae** (aye-aye)
    - **Family Lemuridae** (lemurs)
    - **Family Cheirogaleidae** (lemurs)
    - **Family Lepilemuridae** (lemurs)
    - **Family Indriidae** (lemurs)
    - **Family Lorisidae** (loris)
    - **Family Galaginae** (bushbabies)
    - Family Tarsiisae (Tarsius; tarsiers)
  - **Suborder Platyrrhini (New world monkeys, 47 species)**
    - **Family Callithrichidae** (marmosets)
    - **Family Callimiconidae** (marmosets)
    - Family Aloutattinae (Alouatta, howler monkeys)
    - Family Pitheciinae (Chiropotes, Cacajoa; titi, saki)
    - **Family Cebinea** (squirrel monkeys)
    - Family Atelinae (Ateles, Lagothrix; spider monkeys)
  - Suborder Catarrhini (Old world monkeys, 68 species)
    - **Family Colobinae** (colubus, langurs)
    - **Family Cercopithecinae** (baboons, macaques)
    - Superfamily Hominoidea
      - **Family Hylobatidae** (gibbons)
      - **Family Pongidae** (gorilla, orang, chimp)
      - Family Hominidae (Homo; humans)

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Table 2.

Comparison of sexual characteristics of *Homo sapiens* with other hominoids. (Pongo; Orang, Gorilla; gorilla, Pan; chimpanzee). (VV = very visible). Adapted from Short 1981, Smith 1984. Note with the mating system of *Homo* that while 84% of 853 societies tabulated in Murdock's Ethnographic Atlas permit polygyny, only 10% of men actually practice polygyny, and even where it is widespread, only about 25% of men have several wives at once. Thus modern humans can be considered essentially monogamous (Fisher, 1988). All measurements are in mm.

	Pongo	*Gorilla*	*Pan*	*Homo*
Baculum length	14.8	12.5	6.8	-
Mean erect penis length (range)	40	30	144 (100-180)	(150-200)
Penis flacid condition	invisible	invisible	invisible	visible
penis erect condition	v.visible	invisible	v.visible	visible
mating system	"pair"	alpha male	multi-male	monogamy (16%) polygamy (84%)
sperm competition	low	low	high	low

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Table 3.

Hypothesized loss of the baculum in the hominid line. The mating system and inferred level of sperm competition is also shown for each hominid.

		Hypothesized	
	mating system	sperm competition	Bacula
Homo sapiens	monogamous	low	absent
H. erectus	multi-male	medium	?
H. habilis	mult-male	high	yes
Australopthicines	polygamous	low	yes

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Longitudinal Distance Growth Pattern of Skinfold Thicknesses in Punjabi Infants

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Distance growth pattern of triceps, mid-axillary and sub-scapular skinfold thicknesses based on longitudinally collected data on 154 Punjabi Infants (Male 86, Female 68) between 1 to 12 months of age is described. All measurements were taken by the same investigator at monthly age levels with time tolerance of ± 3 days using standard instrument and techniques. Monthly distance means and standard deviations for these measures of subcutaneous fat are presented. The distance pattern of growth of each of the three measures of subcutaneous fat is characterized by a rise to a peak before commencing to decline. The peak for sub-scapular skinfold thickness was attained at four months while it was reached at three months for triceps and mid-axillary skinfold measurements amongst male infants. Onset of similar peak for three measures of subcutaneous fat was noticed at 5 months of age in female infants. Besides, discussing issues concerning sex differences, a comparison of the skinfold data obtained on Punjabi infants with that of the infants of western origin has also been attempted. The values presented for different skinfold thicknesses may be used as reference base to assess the degree of adiposity amongst infants of Punjabi origin.

Key Words: Growth, Skinfold-thickness, Punjabi, infants.

Skinfold thicknesses are good indicator of subcutaneous fat in the body. These are used in the evaluation of over-nutrition (Seltzer et al., 1965, Seltzer 1967, Llyod and Wolff 1980) and undernutrition (Keet et al 1970), Data emanated from United States (Stuodt et al 1970, Johnston et al 1972, Ferris 1979), Sweden (Karlberg et al., 1968) England (Tanner and Whitehouse, 1975) and Hungary (Eiben

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et al 1990) have widely been used as reference standards to compare and evaluate the degree of adiposity among human subjects of different ages.

Few attempts have been made by Garn (158), Shih (1967), Shukla, et al (1972), Karlberg, et al (1968), Hutchinson-Smith (1973), Schluter et al (1976) Prader et al (1976) to describe the pattern of development of skinfold thicknesses during infancy. Roche et al (1982), have analyzed serial data on subcutaneous fat thickness for 46 sites relating to seven longitudinal studies extending between birth to early middle age and showed obese infants and children tend to become obese adults.

No convincing data depicting serial changes in the subcutaneous fat thickness measured during infancy have been reported from India. However, data on skinfold thicknesses based on cross-sectional studies have been published in earlier reports by Rao et al 1969, Chaudhari and Ramakrishanan 1972, Rathore et al 1975, Hanumantha Rao et al 1976, Kumar and Walia 1977 and Gupta et al 1979. Majority of these studies suffer from infirmities like inadequate sample size, pooling of data assembled on subjects representing different age range rather than the specific ages, and clear description regarding the techniques and instruments used to measure skinfold thickness were also lacking. Consequently, data generated through such poorly designed studies cannot be used to draw meaningful scientific conclusions.

This paper presents distance growth pattern of triceps, midaxillary and sub-scapular skinfold thicknesses studied on longitudinal basis at monthly intervals amongst Punjabi infants from one to 12 months of age.

Materials and Methods

One hundred and fifty four infants (86 male and 68 female) of Punjabi parentage, residing in Chandigarh (India) or its outskirts comprised the sample for this longitudinal study. The gestational ages of the infants ranged form 37+ to 42 weeks and all weighed more than 2500 g at birth. Except for one, all infants were breast-fed from birth to six months. In majority of the cases semi-solid diet was introduced after 5 months of age. None of the infants experienced any serious complication throughout the study span. Other salient characteristics of sample, sampling and follow up techniques have

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already been reported (Bhalla, 1983; Bhalla et al., 1986).
Every infant included in the study was measured by the same investigator (AKB) for triceps, subscapular and mid-axillary skinfold thickness at monthly intervals (between 1 to 12 months of age) with time tolerance of ± 3 days on the day of measurement from May, 1978 to December, 1981. Triceps and subscapular skinfold thicknesses were measured by using the techniques described by Tanner and Whitehouse (1975), while mid-axillary skinfold thickness was recorded by technique recommended by Tanner and Whitehouse (1975), Weiner and Lourie (1969) and White (1963). All measurements were taken on the left side of the body of each child sitting in the mother's lap in Growth Clinic of the Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh. Infants who could not be brought to the clinic on appointed dates were followed up in the respective homes.

Holtain skinfold caliper with a dial calibrated to the accuracy of 0.2 mm was used to take measurements. The average of two measurements taken in millimeters was considered as the final value. The magnitude of intra-observer error for triceps (Mean 0.2mm SD, 0.15mm) and sub-scapular (Mean 0.2mm, SD 0.16mm) skinfold thicknesses was found to vary between 0 to 0.4mm while corresponding values for mid-axillary (mean 0.1mm, SD 0 to 0.9mm) skinfold thickness ranged between 0 to 0.2 mm.

The basic data were transformed into their logarithms (log) to overcome the problem of large fluctuations usually observed with respect to skinfold measurements. Log transformations were done by applying the formula given by Edwards et al (1955)

Suitable statistical analysis was carried out to compute mean (X), standard deviation (SD) for both absolute and log transformed data at each monthly age level. Student's t-test was applied to quantity the magnitude of sex difference.

Results

Mean values accompanied with standard deviation for triceps, subscapular and mid-axillary skinfold thicknesses for both Punjabi male and female infants are given in Tables I to II respectively. Distance curves plotted for three skinfold thicknesses based on log-transformed values amongst infants of two sexes are shown in the Figures.

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The general trend for skinfold is marked by a considerable rise to a peak before commencing to decline (figure). The subscapular skinfold peak was attained at four months of age among male infants. It was reached at 3 months for triceps and mid-axillary skinfold measurements. However, the onset of similar peak was delayed in female infants till about 5 months of age, with respect to all the three skinfold values. Thereafter, a general decrease with minor interruptions was noticed.

Maximum growth of fat at each age level was recorded for triceps and minimum for mid-axillary skinfold thickness. The mean values for subscapular skinfold remained almost intermediate throughout the age range studied.

Male infants possessed marginally higher means for all the skinfolds than female infants of the same age during first few months thereafter, female infants took the lead. The magnitude of sex differences was found to be statistically non significant for all the three measures of fat except for mid-axillary skinfold thickness at 12 months of age where female infants possessed significantly ($p<0.05$) higher mean values than their male counterparts (Table I).

Discussion

The pattern of growth curves for skinfold thicknesses during infancy is difficult to characterize in view of the considerable fluctuations. This may be related to labile nature of fat distribution in the body in response to environmental deficits or disease. The present study shows that there is a general trend for the skinfold thicknesses to rise to a peak after birth before commencing to decline during subsequent months of infancy. The revised standards of Tanner and Whitehouse (1975, placed the peak for the 50th percentile at six months for subscapular skinfold. For triceps, the peak was reached at 6 months in male and 1.0-1.5 years in females. In another study (Fry et al 1975), the occurrence of similar peak with respect to triceps and subscapular was noticed in the 4-6 months age group among Black and 6-8 months age group amongst White and Mexican – American infants. Amongst mild to moderately undernourished Guatemalan infants studied by Malina et al (1974), the peak for triceps, sub-scapular and mid-axillary skinfold thicknesses in both sexes occurred at about 3 months of age.

The attainment of peak occurs at different age levels in infants

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belonging to different population stocks. While a rapid rise to peak followed by subsequent decline, seems to be the trend in all the studies, the age at occurrence of the peak, its duration and the intensity of decline are variable. This trend corroborates with the findings of Johnston (1978), who thought it to be an artefact of small sample size.

The differences between male and female infants were found to change with age. Periods of greater and smaller differences were found to mark the development of sex differences and these were not unidirectional. Between 1 to 4 months of age male infants possessed higher means for all the three measures of fat than the female infants (Figure). This appears to be peculiar finding in contrast to observations made by Chrzastek Spruch (1967) and Lasota (1974) who recorded higher values in girls. The reasons for the sex differences at such an early age are unknown, but Parizkona (1961) confirmed these differences at older ages by using different techniques. Possibly the increased testosterone production in male infants during the first months of infancy might be of importance in this respect (Forest et al, 1973).

Interpopulation comparison showed that Punjabi infants in general possessed lower values for triceps and subscapular skinfolds than their British (Tanner and Whitehouse, 1975); Swedish (Karlberg et al 1968) and German (Schluter et al, 1976) counterparts beyond one month of age. These differences may be racial in origin. On the other hand, the possibility of environmental factors like marginal nutritional excess in the Western infants who are predominantly bottle fed than the predominantly breast fed Punjabi infants as well as the greater exposure to intercurrent infections in the latter may be playing a role in explaining this differential.

Despite a high degree of variability experienced by each skinfold measurement throughout the age range considered, relatively smooth nature (Fig) of the mean trend curves recorded during earlier months of infancy than the vascillatory pattern exhibited by both male and female infants during latter months appears to be an interesting feature of the study. This may be attributed to the protective effects of breastfeeding which was continued up to the age of 5 months amongst all the infants of the present series, whereafter, the supplementary food was added to the diet of infants representing present series.

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Values presented for skinfold thicknesses measured in Punjabi infants represent a high quality data which have been generated by instituting strict quality control measures, during the conduct of this serial study. These include factors like: constancy of sample size, strict adherence of time tolerance limit, use of standard instrument and techniques by the same investigator, homogeneity of racial stock by restricting purely to infants of Punjabi population. Owing to the non-availability of normative serial data on skinfold thicknesses in Indian infants, it is suggested that values presented in this study may be used as reference base to evaluate the degree of adiposity amongst infants of Punjabi stock.

References:

BHALLA A.K., 1983. A longitudinal study of body growth of Punjabi children during first year of life: Ph.D. thesis, Chandigarh, Department of Anthropology, Punjab University, P. 1-300.

BHALLA A.K., KAUL S., and KUMAR V., 1986. A longitudinal study of growth in length and weight of Punjabi infants in Chandigarh, India. Annals of Human biology, 13: 427-431.

CHAUDHARI M.K., RAMAKRISHANAN. N.R., 1972. Nutritional status of rural pre-school children in West Bengal, 1-Nutritional anthropometry. Indian Pediatrics, 9: 136-142.

CHRZASTEK-SPRUCH H., 1967. Badania ciazle and rozwejem fizycznym niemowlat lubelskich metoda okreswych pomiarom anthropometry-eznuch (type written report).

EDWARDS D.A., HAMMOND W.H., HEALY M.J.R., TANNER J.M., and WHITEHOUSE R.W., 1955. Design and accuracy of a caliper for measuring subcutaneous tissue thickness. British journal of Nutrition, 9: 133-143.

EIBEN O.G., BARABAS A., and PANTO E., 1991. THE Hungarian National Growth Study 1 (London) 1-123.

FERRIS A.G., BEAL V.A., LAUS, M.J., and HOSMER D.W., 1979. The effect of feeding on fat deposition in early infancy . Pediatrics, 64: 397-401.

FOREST M.G., CATHIARD A.M., and BERTRAND J.A., 1973, Evidence of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

testicular activity in early infancy. Journal of Clinical Endocrinology and Metobolism, 37: 148-151.

FRY P.C., HOWARD J.E., and LOGAN B.C., 1975. Body weight and skinfold thickness in Black, Mexican American and White infants. Nutrition Reports International, 11: 155.

GARN S.M., 1958. Fat, body, size and growth in the newborn. Human Biology, 30: 265-280.

GUPTA M., JAIN, A., and SINGH R.N., 1978. Nutritional status of urban and rural pre-school children in Western Rajasthan in and around Bikaner city. 1-Anthropometric study. Indian Journal of Pediatrics, 45: 247-254.

HANUMANTHA RAO D., SATYANARAYANA K., and SASTRY J.G., 1976. Growth pattern of well-to-do Hyderabad pre-school children. Indian Journal of Medical Research, 64: 629-638.

HUTCHINSON-SMITH B., 1973. Skinfold thickness in infancy in relation to birth weight. Developmental Medicine and Child Neurology, 15: 628-634.

JOHNSTON F.E., HAMILL P.V.V. and LEMESHOW S., 1972. Skinfold thickness of children 6-11 years, United States. Vital and Health Statistics Series 11, No. 120.

JOHNSTON F.E., 1978. Somatic growth of the infants and pre-school children. In (F. Falkner and J.M. Tanner, eds) Human growth, vol 2, pp 91-116. Bailliere: Tindall.

KARLBERG P., ENGSTROM J., LICHTENSTEIN H., and SVENBERG 1., 1968. The development of children in a Swedesh Urban Community; a prospective longitudinal study. III Physical growth during the first three years of life. Acta Paediatrica Scandinavica, Supplement 187: 48.

KEET M.P., HANSEN J.D.L. and TRUSWELL A.S., 1970. Are skinfold measurements of value in the assessment of suboptimal nutrition in young children ? Pediatrics, 45: 965-972.

KUMAR V AND WALIA B.N.S., 1977. Profile of mainutrition in the community and in the hospital. In XV International Congress of Pediatrics Current Topics in Pediatrics, pp. 155. New Delhi.

LASOTA A., 1974. Development of morphological traits in children at the age of 0-3 years. In (N. Wolanski,). Studies in Human Biology, pp. 77-106.

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ELECTRONIC REPRODUCTION PROHIBITED

PWN-Polish Scientific Publishers.

MALINA R.M., HABICHT J.P., YARBROUGH C., MARTORELL R., and KLEIN R.E., 1974. Skinfold thicknesses at seven sites in rural Gautemalan Ladino children birth through seven years of age. Human biology, 46: 453-469.

PARIZKOVA J., 1961. Total body fat and skinfold thickness in children. Metabolism, 10: 794-807.

PRADER A, HERNESNIEMI I. And ZACHMANN H., 1976. Skinfold thickness in infancy and adolescence: a longitudinal correlation study in normal children. In the Adipose Child. pp. 84-88. S. Karger.

RAO P.N., SINGH D. and SWAMINATHAN M.C., 1969. Nutritional status of Pre-school children of rural communities near Hyderabad city. Indian Journal of Medical Research, 57: 2132-2146.

RATHORE B.S., MATHUR S. and SAXENA J., 1975. Nutritional anthropometry of 1000 children dwelling in slum area of Jaipur compared to that of 500 children of the elite. Indian Journal of Pediatrics, 42: 264-276.

ROCHE A.F., SIERVOGEL R.M., CHUMLEA W.C., REED R.B., EICHORN D.M. and McCAMMON R.M., 1982. Serial changes in subcutaneous fat thickness of children and adults. pp 1-110. S. Karger.

SCHLUTER K., FUNFACK W., and WEBER B., 1976. Longitudinal studies on changes of skinfold diameter during infancy. In TheAdipose Child. pp. 70-77. Basel: S. Karger.

SELTZER C.C., GOLDMAN R.F., and MAYER J., 1965. The triceps skinfold as a predictive measure of body density and body fat in adolescent girls. Pediatrics, 36: 212-218.

SELTZER C.C., and MAYER J., 1967. Greater reliability of the triceps skinfold over the subscapular skinfold as an index of obesity. American Journal of Clinical Nutrition, 20: 950-953.

SHIH S.C., 1967. Skinfold measurements in infants and pre-school children in Taiwan. Journal of Formosan Medical Association, 2: 145.

SHUKLA A., FORSYTH H.A., ANDERSON C., and MARWAH., S.M., 1972. Infantile overnutrition in the first year of life: A field infantile study of Dudley, Worcestershire. British Medical Journal, iv: 507-515.

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ELECTRONIC REPRODUCTION PROHIBITED

STOUDT H.W., DAMON A., and McFARLAND R.A., 1970. Skinfolds, body girths, biacromial diameter and selected anthropometric indices of adults. United States, 1960-62. Vital and Health Statistics series, 11: No. 35.

TANNER, J.M., WHITEHOUSE R.H., 1975. Revised standards for triceps and subscapular skinfolds in British Children. Archives of Disease in Childhood, 50: 142-145.

WEINER J.S., LOURIE J.A., 1969. Human Biology – A Guide to Field Methods. Blackwell. Oxford.

WHITE R.M., 1963. Skinfold thickness measurements. In (H.T.E. Hertzberg, E. Curchill, C.W. Dupertuis, R.M. White and A. Damon, eds). Anthropometric Survey of Turkey, Greece and Italy, pp. 61 and 118. Pergamon Press. Oxford

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Table I: Mean, (S.D.) Skinfold Thicknesses (mm) in Punjabi Male infants

	Triceps (mm)				Mid-axillary (mm)			Sub-scapular (mm)		
Age (months)	N	$\bar{X}$	SD	Sex Differences (t-value)	$\bar{X}$	SD	Sex Differences (t-value)	$\bar{X}$	SD	Sex Differences (t-value)
1	86	6.21	1.2	1.40	5.74	1.19	0.41	6.07	1.20	0.57
2	86	6.82	3	1.09	6.19	1.17	0.02	6.62	1.27	0.07
3	86	7.11	1.3	1.61	6.35	1.31	0.87	6.74	1.23	0.14
4	86	7.03	4	0.50	6.27	1.43	0.76	6.78	1.24	0.14
5	86	7.04	1.4	0.13	6.01	1.25	1.00	6.63	1.33	0.92
6	86	7.09	5	0.07	5.92	1.41	0.65	6.69	1.32	0.05
7	86	7.04	1.5	0.92	5.92	1.45	0.35	6.56	1.38	0.03
8	86	6.82	3	0.28	5.74	1.46	0.98	6.40	1.29	0.55
9	86	6.67	1.5	0.46	5.50	1.24	1.64	6.26	1.21	0.40
10	86	6.66	1	0.37	5.51	1.20	0.97	6.30	1.19	0.06
11	86	6.51	1.6	1.17	5.50	1.14	1.34	6.22	1.14	1.12
12	86	6.61	7	1.05	5.39	1.13	2.28*	6.23	1.16	1.46

* $p<0.05$ (d.f = 152 at each age level)

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Table II: Mean, (S.D.) Skinfold Thicknesses (mm) in Punjabi female infants

Age (months)	N	Triceps (mm) $\bar{X}$	SD	Mid-axillary (mm) $\bar{X}$	SD	Sub-scapular (mm) $\bar{X}$	SD
1	68	5.91	1.35	5.65	1.44	5.94	1.47
2	68	6.58	1.33	6.19	1.53	6.63	1.50
3	68	6.75	1.26	6.16	1.40	6.71	1.54
4	68	6.92	1.32	6.10	1.16	6.75	1.42
5	68	7.07	1.38	6.22	1.33	6.84	1.48
6	68	7.06	1.27	6.07	1.30	6.68	1.34
7	68	6.83	1.02	6.00	1.26	6.56	1.26
8	68	6.89	1.40	6.97	1.35	6.52	1.32
9	68	6.77	1.23	5.83	1.19	6.34	1.23
10	68	6.74	1.31	5.69	1.11	6.31	1.22
11	68	6.77	1.39	5.74	1.06	6.44	1.24
12	68	6.85	1.31	5.78	0.92	6.52	1.29

Figure Legend:

Distance curves (log transformed) for triceps, mid-axillary and subscapular skinfold thicknesses of male and female Punjabi infants.

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Man
Between Past and Future

BRUNETTO CHIARELLI
University of Florence, Italy

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Age Trends in Anthropometric Characteristics among an Elderly Population of Bengalee Hindu Males in Calcutta, India

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Human Genetics Laboratory, University of Calcutta

A cross-sectional investigation of 210 Bengalee Hindu elderly men (aged-55 years and above) of Kalighat, Calcutta, India, was undertaken to study age trends in 15 anthropometric measures. The subjects were categorized into three groups: Group 1: 55-59 years (n = 40); Group 11: 60-69 years (n = 90), and Group 111: 70 years and above (n = 80). Results revealed that there were significant group differences with Group III (G III) having significantly lower means for most variables compared with Group I (G I). Individuals in Group II (G II) had intermediate values between G I and G III. Correlation studies demonstrated that there was a significantly decreasing trend, from G I to G III, in the relationship of age with these measures. It was observed that while age had a significant positive effect on fat mass (FM) in G I, it had significant negative effect in G II and G III. Age also had significant negative effect on percent body fat (PBF) and fat mass index (FMI) in G II. In G III, age had significant negative effect on arm muscle circumference (AMC), arm muscle area (AMA) and FMI.

Results also revealed that PBF had significant negative correlations with AMC and AMA in age G I and G II, but not in G III. In general, there was a increasing trend of correlation between these measures from G I to G III. In G II the strength of the correlations were intermediate between G I and G III. Discriminant analysis showed that overall, 71.1% of all cases were correctly classified using these anthropometric measures. None of the individuals in G I and G III were misclassified into G III and G I, respectively. There was better discrimination in G 111 (87.5%) than in G 11 (74,4%) and G 1 (62.5%).

Key Words: Ageing, anthropometry, body fat, muscle

Medical advances and social changes in the recent past have altered the demographic structure of developing countries. As a

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consequence of increased average longevity, the proportion of older adults in the overall population is steadily increasing. India being a developing country, is expected to experience a rapid growth in her older (aged 55 years and above) population. According to the 1991 Census, the total aged population is approximately 109 million, or 12.9% of the total population. This percentage will increase to 14% by the year 2020 (Kinsella and Suzman, 1992). This emerging elderly population is expected to have many health problems, particularly with reference to the prevalence of degenerative diseases like non-insulin dependent diabetes mellitus (NIDDM), coronary heart disease (CHD) and hypertension (HT). The consequences of these increased prevalence will require greater attention and resources.

The non-invasive technique of anthropometry could used to provide information on health and nutritional status all ages including elderly individuals. Many studies (Burr Phillips, 1984; Chumlea et al., 1986; Shimokata et al., Micozzi and Harris, 1990; Yassin and Terry, 1991) have already been reported on health and nutritional status among elderly individuals utilizing anthropometry from different parts of the world. However, to date, no study has reported anthropometric information on the elderly in India.

The purpose of the present investigation was to examine the effect of age on selected anthropometric variables and indices among elderly Bengalee Hindu males of Kalighat, South Calcutta, India.

Material and Methods

The study population of the present investigation consisted of 210 male individuals aged 55 years and above. They belonged to the Bengalee Hindu caste population residing in 88 ward at Kalighat, South Calcutta. Primary information including name, address and age of randomly selected 230 individuals were from the local voter list of 1998. Prior to measurement, verbal information was sent to all selected individuals. Out of 230 selected males, responses were available.

The subjects were requested to make an at their house. All 210 individuals have been into three discreet age groups following Yassin and Terry's (1991) classification. Individuals belonging to Group I, Group II and Group III are in the age categories of 55-59 years, 60-69 years and 70 years and above, respectively.

All anthropometric measurements were made by A. Ghosh, one

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of the authors, using standard anthropometric techniques (Cameron, 1984). Height and sitting height (SH) were measured to the nearest 0.1 cm. using Martin's anthropometer. The body weight, of lightly clothed subjects were recorded to nearest 0.5 kg on a weighing scale (Doctor Beliram & Sons, New Delhi, India). Both for height as well as weight, participants-were requested to remove their shoes prior to taking measurement. Circumference measurements were made to the nearest 0.1 cm. using a tape measure (Triced, Shanghai, China). Minimum waist circumference (MWC) was measured between the iliac crest and lower ribs whereas Maximum hip circumference (MHC) was taken at the level of greatest protrusion of the buttocks (Cameron, 1984). Mid upper arm circumference (MUAC) was measured (nearest 0.1 cm.) on the left side of the collected from 210 individuals. appointment categorized body. Left hand triceps skinfold (TSF) was measured, to the nearest 0.1 mm., at the same level of the MUAC measurement, using a Harpenden skinfold-calliper.

A total of eight indices were derived to study relative fat patterning and body composition.

Body mass index (BMI) was computed using the standard equation (Chumlea et al., 1986):

$$BMI = \text{Weight in kg} / (\text{stature in meters})^2$$

Waist-hip ratio (WHR) was computed after Yassin (1991). and Terry:

$$WHR = \text{Waist circumference in cm} / \text{hip circumference in cm}$$

Conicity index (CI) was derived using the equation of Valdez et al. (1993):

$$CI = \text{Waist circumference (m)}/(0.109) \times (\text{weight (kg)}/\text{Height (m)}$$

Arm muscle circumference (AMC, mm) and arm muscle area (AMA, mm^2) were calculated using the following formulae of Burr and Phillips (1984):

$$AMC = \text{mid upper arm circumference} = \pi \text{ (triceps skinfold)}$$

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Table I: Mean, standard error of mean and standard deviation of anthropometric variables and indices among elderly Bengalee Hindu men

Variable	Mean	SEM	SD
Height (cm)	161.9	0.36	5.16
Weight (kg)	57.9	0.49	7.09
Sitting height (cm)	81.4	0.22	3.25
Body mass index (kg/m^2)	22.1	0.17	0.24
Minimum waist circumference (cm)	78.2	0.53	7.65
Maximum hip circumference (cm)	83.2	0.40	5.73

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Mid upper arm circumference (cm)	21.9	0.24	3.43
Triceps skinfold (mm)	12.4	0.34	4.87
Waist hip ratio	0.94	0.004	0.051
Conicity index	1.20	0.006	0.092
Arm muscle circumference (mm)	180.10	2.165	31.372
Arm muscle area (mm^2)	2659.08	59.260	858.754
Percent body fat	21.88	0.379	5.491
Fat mass (kg)	12.77	0.268	3.889
Fat mass index (kg/m^2)	4.85	0.098	1.414

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Table II: Results of oneway analysis (Scheffe's' test) of anthropometric variables and indices by age group among elderly Bengalee Hindu men

Variable	Age Groups: Group I Mean	Group II Mean	Group III Mean	F Ratio	p
Height** (cm)	163.4	163.2	159.8	12.188	< 0.0001
Weight** (kg)	59.8	60.4	54.0	22.972	< 0.0001
Sitting height** (cm)	82.7	82.4	79.7	23.350	< 0.0001
Body mass index** (kg/m^2)	22.4	22.7	21.2	9.647	< 0.0005
Minimum waist** circumference (cm)	80.1	80.1	75.0	12.265	< 0.0001
Maximum hip** circumference (cm)	85.4	84.6	80.4	17.603	< 0.0001

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Mid upper arm*** circumference (cm)	24.7	22.5	19.9	37.750	< 0.0001
Triceps*** skinfold (mm)	17.6	14.3	7.8	162.381	< 0.0001
Waist hip ratio	0.94	0.95	0.93	1.675	n.s.
Conicity index	1.22	1.21	1.19	0.102	n.s.
Arm muscle* circumference (mm)	191.49	180.15	174.34	4.105	< 0.025
Arm muscle* area (mm^2)	2986.35	2653.55	2501.66	4.389	< 0.025
Percent body fat***	27.04	24.17	16.72	144.325	< 0.0001
Fat mass (kg)***	16.2	14.6	9.0	156.046	< 0.0001
Fat mass*** index (kg/m^2)	6.06	5.49	3.53	134.002	< 0.0001

* Group III has significantly lower mean compared with Group 1.
** Group III has significantly lower mean than both Group I and Group II
*** Group III has significantly lower mean than Group I and Group II; Group II has significantly lower mean than Group I.

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Table III: Pearson correlation coefficients of age with anthropometric variables and indices in the three age groups of Bangalee Hindu men

	Age Groups		
	Group I 55 - 59 yrs (n = 40)	Group II 60 - 69 yrs (n = 90)	Group III 70+ yrs (n = 80)
Correlates	r	r	r
AGE WITH			
Height	0.21	- 0.06	- 0.44**
Weight	0.48**	- 0.28*	- 0.47**
Sitting height	0.24	- 0.12	- 0.49**
Body mass index	0.31	- 0.29*	- 0.30*

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Waist circumference	- 0.07	- 0.15	- 0.48**
Hip circumference	- 0.31	- 0.21	- 0.50**
Upper arm circumference	0.06	- 0.23	- 0.55**
Triceps skinfold	- 0.01	- 0.54**	- 0.17
Waist hip ratio	0.18	- 0.03	- 0.23
Conicity index	- 0.41*	0.02	- 0.36**
Arm muscle circumference	0.06	- 0.01	- 0.51**
Arm muscle area	0.06	- 0.03	- 0.47**
Percent body fat	- 0.02	- 0.55**	- 0.15
Fat mass	0.43*	- 0.60**	- 0.36**
Fat mass index	0.26	- 0.60**	- 0.27*

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Table IV: Significant effect of age on percent body fat, fat mass, fat mass index, arm muscle circumference and arm muscle area in the three age groups

	B	SEB	Beta	T	Sig. T
AGE GROUP I					
Fat mass	0.491	0.168	0.428	2.923	< 0.01

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AGE GROUP II					
Percent body fat	-0.707	0.116	-0.546	-6.117	< 0.0001
Fat mass	-0.601	0.085	-0.600	-7.040	< 0.0001
Fat mass index	-0.219	0.031	-0.597	-6.984	0.0001
AGE GROUP III					
Arm muscle circumference	-4.229	0.816	-0.506	-5.183	< 0.0001
Arm muscle area	-116.017	24.517	-0.472	-4.732	< 0.0001
Fatmass	-0.240	0.071	-0.357	-3.374	< 0.0025
Fatmass index	-0.070	0.029	-0.266	-2.433	< 0.025

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Table V: Correlation of arm muscle circumference (AMC) and arm muscle area (AMA) with percent body fat (PBF), fat mass (FM) and fat mass index (FMI) in the three age groups

Correlates	Age Group I	Age Group II	Age Group III
AMC with			
PBF	- 0.50*	- 0.34*	- 0.11
FM	- 0.22	- 0.10	0.08
FMI	- 0.18	- 0.10	0.03

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AMA with			
PBF	- 0.56*	- 0.33*	- 0.10
FM	- 0.25	- 0.06	0.08
FMI	- 0.22	- 0.06	0.04

* $p < 0.001$.

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Table VI: Results of discriminant analysis of the three age groups

Actual Group	Number of cases	Predicted Group Membership I	II	III
I	40	25 (62.5)	15 (37.5)	0 (0.0)
II	90	13 (14.4)	67 (74.4)	10 (11.1)
III	80	0 (0.0)	10 (12.5)	70 (87.5)

Percent of grouped cases correctly classified = 77.1%.

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$$AMA = (\text{Arm muscle circumference})^2 / 4\pi$$

Three measures of body fat composition, namely Percentage Body Fat (PBF), Fat Mass (FN) and Fat Mass Index (FMI) were studied. Estimate of PBF-was made from triceps skinfold measurement using the equation derived by Durnin and Womersley (1974). Fat mass was then calculated.

The following equations were used:

PBF = (4.95 density 4.5) 1,00 where

density = 1.1143 (0.0618 x loglOtriceps).

FM (kg) = percentage body fat / (100 x weight (kg))

FMI (fat mass normalised for height) was calculated according to Vanitallie et al. (1990):

FMI = Fat Mass in kg / height inm^2

Technical error of measurements (TEM) and the results were found to be within reference Ulijaszek and Lourie (1994). Thus, TEM was not statistical analysis. All statistical,analyses using the SPSS Package (SPSS/PC+ Version 5).

Results

Table I presents the means, standard errors of means and standard deviations of the anthropometric characteristics of the studied population. Differences in mean values of anthropometric variables and indices between the three age group categories were examined using oneway analysis and the results are presented in Table II. Significant differences were observed between age groups for all characteristics except WHR and CI. Scheffe's Test (Table II) demonstrated that Group III had significantly lower means of AMC and AMA compared with Group I; lower values of height, weight, SH, BMI, MWC and MHC compared with both Group I as well as Group II. For TSF, MUAC, PBF, FM and FMI, Group III had significantly lower means compared with both Group I and Group II;

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Group II also had significantly lower mean than Group I.

Table III presents the Pearson correlation coefficients (r) of age with all the anthropometric variables and indices in the three age group categories. Significant positive correlations of age were observed with weight (r = 0.48) and FM (r 0.43) in Group I but there existed significant negative correlations in.Group II (weight: - 0.28; FM: - 0.60) and Group, III (weight: - 0.47; FM = - 0.36). In the case of most of the other variables and indices, while there existed weak nonsignificant correlations in Group I, significant negative correlations were observed in Group III. The correlation coefficients in Group II, in most cases, were intermediate between Group I and Group III. Thus, there existed a trend of decreasing correlation of age with anthropometric characteristics from Group I to Group III. The relationship between age and the three body fat composition measures (PBF, FM and FMI), and two muscle measures (AMC and AMA), in the three age groups, was investigated using multiple regression analysis. Results (Table IV) revealed (only significant results are shown) thatwhile age had a significant positive effect ($t = 2.923$, $p < 0.01$) on FM in Group 1, it had significant negative effect in Group II (t 7.040, $p < 0.0001$) and Group III (t 3.374, $p < 0.0025$). Age also, had significant negative effect on PBF ($t = - 6.117$, $p < 0.0001$) and FMI (t 6.984, $p < 0.0001$) in Group II. In Group III, age had significant negative effect on AMC ($t = 5.183$, $p < 0.0001$), AMA (t 4.732, $p < 0.0001$) and FMI (t 2.433, $p < 0.025$).

The interrelationship between age and the three body fat composition measures (PBF, FM and FMI), and two muscle measures (AMC and AMA), was further investigated using correlation analysis. Results (Table V) revealed that PBF had significant negative correlations with AMC and AMA in age Group I (PBF-AMC 0.50, PBF-AMA 0.56) and Group II (PBF-AMC 0.34, PBF7AMA - 0.33) but not in age Group III. In general, there was a increasing trend of correlation between these measures from Group I to Group III. In Group II the strength of the correlations were intermediate between Group I and Group III.

Since there were significant differences between the multiple regression analysis significant results are shown) that while age had a three groups in anthropometric measures, discriminant analysis (corrected for group size) was undertaken to deterihine how well individuals in the three age groups could be correctly classified

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utilising these variables/indices. Results (Table VI) showed that overall, 77.1% of all cases were correctly classified. None misclassified There was better of the individuals in Group I and Gro II into Group III and Group 1, respectively. discrimination in Group 111 (87.5%) than in Group 1 (62.5%). The most discriminating the three groups were TSF, AMC, FM, SH, PBF,

Discussion

Group 11 (74.4%) and variables/indices of weight, CI and AMA. Interest in fat patterning has increased remarkably in recent years because of strong association with a variety of degenerative diseases like NIDDM, CHD and HT (Shimokata et al., 1989). Concomitant with ageing, changes occur in body proportion, structure, as well as metabolic and physiological variables. However, the changes vary between populations (Zivicnjak et al., 1997). The present study investigated age trends in various anthropometric variables and indices, of 210 elderly male individuals aged 55 and above, belonging to Bengalee Hindu caste population of Kalighat (South Calcutta), India. To date, no study from India has reported age trends of anthropometric measures among the elderly.

In the present study, there was a decreasing trend with age for all (except WHR and CI) anthropometric characteristics (Table II) among Bengalee Hindu caste males. Furthermore, age was significantly negatively anthropometric characteristics, in most cases, in Group III but not in Group I (Table III). The strength of the significant related to correlations in Group II were intermediate Oetween Lnatie uL -3k%j"v I and Group III. Results of this investigation are in concordance with.reports of a declining trend in anthropometric measures with age in Britain (Burr and Phillips, 1984), Malaysia (Yassin and Terry, 1991) and in USA (Chumlea et al., 1986). A noteworthy point is the fact that both the measures of central adiposity, namely WHR and CI, do not differ significantly between the age groups. This implies that central adiposity, in terms of WHR and CI, in elderly Bengalee population remain unchanged. But proportionate changes due to age on the independent measures forming the two indices were evidenced from correlation values (Table III).

While a significant positive association existed between age and FM in Group I (Table IV) these were significantly negative in Groups

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II and III. This result indicates that while FM increases significantly with age in Group I it decreases significantly with age in the latter age groups. Furthermore, age had significant negative effect on PBF and FMI in Group II; and AMC, AMA and FMI in Group III. Thus, there existed a clear trend of decreasing fat in the intermediate age group and decreasing fat and muscle in the oldest age group- Furthermore, it was observed (Table V that AMC and AMA decreased significantly with PBF in Group I and Group II but not in Group III. This result implies that as PBF increases, muscle circumference and area decrease significantly in Groups I and II.

Results of discriminant analysis utilising anthropometric measures (corrected for group size) indicated that (Table VI) the individuals could be correctly classified in most cases (77.1%), with individuals in Group 111 (87.5%) being better classified than those in Group I (u2.5%). In Group 11, 74.4% were classified. More importantly, none (0%) of the Group I individuals were misclassified intq Group III, and vice versa. These results provided evidence that the anthropometric characteristi.cs of Group I and Group III were very different from each other, with those belonging to Group II having intermediate characteristics.

As previously mentioned, there are no population-based data on age trends in anthropometric measures of elderly people from India. Results from the present investigation demonstrated unequivocally that there existed definite age trends in anthropometric characteristics in a population of Bengalee Hindu males from Calcutta. In general, there was in inverse relationship, i.e., with increasing age there is a significant decrease in values of anthropometric measures.

More studies are needed to elucidate whether similar observed among the elderly in other ethnic groups resident in India. Since the process of ageing also involves metabolic and physiological alterations, including hormonal changes, it would be interesting to undertake similar research on the elderly female population from different Indian populations. Furthermore, longitudinal studies on ageing and changes in anthropometric/metabolic measures should be undertaken so as to better understand the mechanism of ageing. Moreover, it should be noted that, to date, in India, no study has investigated body fat (visceral and intra-aLbdominal) utilising direct measures of adiposity like magnetic resonance imaging (MRI) and CT (computed tomography) scans. Such studies are much needed to

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gain comprehensive information on anthropometric changes, particularly trends are with respect to visceral and intra-abdominal fat, involved in the ageing process of the elderly.

Finally, new insight on the-role of 'gene-environment' interaction involved in the process of ageing among the elderly would be obtained from comparative studies of migrant Indians and other ethnic groups resident in different parts of the world. Countries with a large number of people of Indian origin like Britain, Fiji, Mauritius, Malaysia, South Africa, Trinidad and USA offer unique opportunities for conducting such studies.

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References

Burr, M. L. the elderly and Phillips, K.M. (1984). Anthropometric norms in *British Journal of Nutrition*, 51: 165 - lb9.

Cameron, N. (1984). The Measurement of Human Growth. pp. 46 99. Sydney: Coom Helm Ltd.

Chumlea, W.C. Roche, A.F. and Mukherjee, D. (1986). Some anthropometric norms of body composition for elderly adults. *Journal of Gerontology*, 41: 36 - 39.

Durnin, J.V.J. and Womersiey, J. (1974). Body fat assessed from total body density and its estimation from skinfold thickness: measurements on 481 men and women aged from 16 to 72 years. *British Journal of Nutrition*, 32: 77 - 97.

Kinsella, K. and Suzmaft, R. (1992). Demographic dimension of population aging in developing countries. *American Journal of Human Biology*, 4: 3 - 8.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Micozzi, M.S. and Harris, T.M. (1990). Age Variations in the Relation of Body Mass Indices to Estimates of Body Fat and Muscle Mass. *American Journal of Physical Anthropology*, 81: 375 - 379.

Shimokata, H. Tobin, J.D. Muller, D.C. Elahi, D. Coon, P.J. and Andres, R. (1989). Studies in the distribution of body fat: effect of age, sex and obesity. Journal of Gerontology, 44: M66 - M73.

Ulijaszek, S.J. and Lourie, J.A. (1994). Errors of measurements. In Anthropometry, the Individual and Population. pp. 30 - 35. Eds: S.J. Ulijaszek and C.G.N. Mascie-Taylor. Cambridge: Cambridge University Press.

Valdez, R. Seidell, J.C. Ahu, Y.I. and Weiss, K.M. (1993). A new index of abdominal adiposity as an indicator of risk for cardiovascular disease. A cross population study. *International Journal of Obesity*, 17: 77 - 82.

Vanitallie, T.B. Yang, M.U. Heymsfield, S.B. Funk, R.C. and Boileau, R.A. (1990). Height normalized indices of the body's fat free mass and fat mass: Potentially useful indicators of nutritional status. *American Journal 6f Clinical Nutrition*, 52: 953 - 959.

Yassin, Z. and Terry, R. (1991). Anthropometric characteristics of rural elderly females in Malaysia. *Ecology of Food and Nutrition*, 26: 109 - 117.

Zivicnjak, M. Szirovicza, L. Pavicic, N. Smolej-Naranci'c, B. Janicijevic, J. and Rudan, P. (1997), The Aging Process: Analysis of the Latent Structure of Body Morphology (in Males). *Collegium Anthropology*, 21: 117 - 126.

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Racial Differences in Pain Perception: a Biological Basis

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Behavioral differences between the various human races have been observed (e.g. intelligence). The perception of pain is essential for human survival. Individual as well as group differences have been reported in pain behavior, suggesting that pain behavior may be genetically influenced. To develop more efficacious pain treatment, it will be important to understand the genetic mechanism of pain and to uncover any differences between the races. The presence of genetic differences will indicate the need to consider race in future pain management strategies.

Key Words: nociception; pain; racial differences

Racial differences in skeleto-muscular, endocrine and nervous systems have been previously described (e.g., Baker, 1974; Yanovski et al., 1996). Because phenotype and behavior shows significant heritability, they are, at least partially, genetically mediated. For example, Asian American students will academically outperform black American students, regardless of socio-economic standing (NSF, 1994). Conversely, it should be no surprise that blacks are athletically more able than Asians.

Genes are thought to mediate many behaviors, ranging from aggression to self-discipline, since their level of expression markedly differ between the races and have moderate to high heritabilities (Rushton, 1995). The perception of pain is a mechanism by which humans receive bodily as well as environmental information. Although it may seem that having no pain perception maybe beneficial, in reality a dysfunctional pain perception system is deleterious. For example, patients who are congenitally insensitive to pain repeatedly inflict severe injuries upon themselves and require constant medical attention. The reduced pain perception is due to gene mutations that alter normal sensory neuron function (Mardy et

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al., 1999). Conversely, heritable pathologies exist that exacerbate pain perception, such that the usual stimulus is now perceived as extremely painful (references in Mogil et al., 1999a). Growing evidence indicate that genes play an important role in pain perception, just as genes may be important in other kinds of behaviors.

The current paper reviews racial differences in pain perception. Evidence for the genetic basis of pain perception is reviewed in animal studies, which may have relevance to humans. Ultimately, the goal is to identify genes that are involved in normal as well as abnormal pain sensation and to devise treatment based on empirical data.

Pain is defined as the sensation that accompanies impending or ongoing tissue damage. Pain detection and the response to it is crucial for survival. The diverse responses to pain range from simple to complex behaviors, from a withdrawal reflex to remembering that touching a hot stove has dire consequences. In humans, the painful sensory experience has been characterized as biphasic, the first phase being perceptual/sensory and the second phase being reactive (Bonica, 1990). This means that a pain experience can be compartmentalized into a phase where pain is detected or realized, then a phase where there is a response to pain. The response to pain integrates emotion, affect and memory.

There are those who argue that environment shapes pain behavior. "Environmentalists" argue that individual as well as racial differences in pain perception are due to cultural background. Another force that shapes pain behavior is learning (Melzack and Wall, 1982).

Pain – Nurture?

Pain has a unique status in human societies. Ceremonial torture and mutilation, involving excruciating pain, are used by some societies as tests of loyalty or worthiness. Thus, high tolerance of pain, in a religious or spiritual context, is viewed as desirable. However, long-term pain arising from illness, is viewed differently. Rural Black Africans believe that illness and the accompanying pain are signs of possession by evil spirits and an inevitable facts of life. Thus, they rarely seek medical attention. When Africans do take analgesics, they are under the false impression that they have been cured of illness

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since the pain has stopped. Africans quickly leave the clinic and since the underlying disease was not treated, they usually succumbs to the disease within a few weeks.

In contrast, American Jews have a more clinical attitude of pain, which is taken as a symptom of physiological dysfunction. Jews have lower pain tolerances, are highly vocal of their pain and more apt to seek medical assistance for their pain. Greenblum (1974) suggested that the Jewish orientation to pain is inculcated in early life as a symptom of illness, which leads to the development of increased sensitivity or awareness to bodily functions. Jews report illnesses, utilize secondary health care, such as psychiatry, place greater trust in the medical profession at a rate higher than that of other racial groups with similar SES. Thus, to Jews, pain is an indication that requires immediate medical attention, with serious consequences for long-term health and welfare.

Another aspect of pain perception that may be unique to Jews is its malleability. Following measurement of pain threshold, American Jews were told that their pain threshold was lower than that of Euro-Americans, and Euro-Americans were told the opposite. After a second measurement, Euro-American pain thresholds did not change, but Jewish pain thresholds increased. It has been suggested that challenges that threaten Jewish interests, here symbolized by a challenge to increase pain threshold, may evoke changes in behavior that serves to reinforce Jewish identity and group solidarity (Greenblum, 1974). If this is true, the lack of effect of prompting on Euro-American pain thresholds suggests that Euro-Americans cannot manipulate pain perception as well as Jews or that Euro-Americans lack a sense of group cohesiveness. Although the underlying basis for these traits in Jews have been rationalized in historical-religious terms, a genetic basis has never been proposed. The effect of "cultural influences" on human pain perception has yet to be defined, but it possible that these "influences" are of genetic origin.

Racial Differences in Pain Perception - Clinical Observations

Methods that have been used to validate a genetic basis of intelligence, such as testing of twins, have not been extensively used to identify a possible role of genes in human pain behavior. Regardless, genes are likely to have an important role in pain since clinical reports point out individual and racial differences in response

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to painful stimuli, in attitudes towards pain and responsiveness to analgesics. It has often been noted that responsiveness to painful stimuli as well as analgesics differs from person to person (Zborowski, 1969; Chen et al., 1989; Houghton et al, 1992). Also, intraracial variability has been reported. For example, Northern European whites are less responsive to painful stimuli than Mediterranean whites. Variability is also observed in Negroids: American blacks appear to be more stoic to pain than West African blacks. (in Zatzik and Dimsdale, 1990). It is possible that environment may modulate pain perception, but the exact mechanism by which environment interacts with a behavior like pain perception is not known. The claim of egalitarians is that behavior is a function of environment, but it is uncertain if the same claim holds for pain.

Group differences in pain perception have been reported as well, but these studies should be scrutinized with two consideration. First, racial categorization has never been rigorously defined. Studies have used lose racial groupings, such as "Caucasian," "Black descent" or "Oriental." In one study, racial determination was by observation of skin color (Woodrow et al., 1972). Since some classification of "Asian" have included races as diverse as Polynesians and Koreans, one cannot be sure if differences between "Asians" and "Whites" are real racial differences. Equally vexing is the classification of "Black". Contemporary American blacks are a heterogeneous population, ranging from Afro-Caribbean and Negroid immigrants to those with varying degrees of white ancestry (Baker, 1974). Lack of attention to racial background maybe one reason why the field has many conflicting reports on racial differences in pain perception.

Secondly, methods used to evaluate pain have widely varied. In studying experimental pain, healthy volunteers are exposed to brief noxious stimulation. Various kinds of stimuli have been utilized, including heat and cold, electric shock and pressure. The two common behavioral measures in these studies are "threshold" and "tolerance." The level at which the subject feels that the stimulus is painful is referred to as "threshold." Occasionally, the subject is asked to endure the pain as much as possible in order to determine the level of "tolerance." Since "threshold" is a measure of the initial detection of pain and "tolerance" requires a focused effort to tolerate pain, it is likely that these behavioral tests measure distinct pain mechanisms. It is also possible that the different stimuli used activate

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different pain pathways. Thus, the use of different stimuli from study to study complicates comparison across studies. With these caveats in mind, however, racial differences in human pain are evident.

North American "Caucasians" have slightly higher pain thresholds than native Japanese, whereas American-born Japanese (second and third-generation) had higher pain thresholds than either whites or native Japanese (Chapman et al., 1982). Although the average stimulus level (that which is needed to evoke "mild" to "moderate" pain) was higher for whites, self-reported pain thresholds were almost similar between whites and native Japanese. These observations suggest that objective measures of pain (e.g. stimulus intensity) rather than subjective measures (self-reporting) may point out racial differences in pain. Other studies have found that "Asians" had lower thresholds and tolerance than Caucasians, supporting the contention that Asians are more sensitive to pain (Woodrow et al., 1972; Knox et al., 1977). The study by Woodrow et al. did not mention if the Asians were recent immigrants ("native") or 2nd generation, whereas in the study by Knox et al. (1977), the Asians were Chinese from Taiwan, Hong Kong and Malaysia. It is possible that some of the pain behavior may be influenced culturally, as seen in the differential responsiveness between American Japanese and native Japanese. The cultural as well as genetic factors, should be identified and their influence assessed experimentally in these people.

In comparing North American whites and blacks, blacks are more responsive to painful stimuli than whites, whether the stimulus was heat or pressure (Woodrow et al., 1972; Zatzick and Dimsdale, 1990; Edwards and Fillingim, 1998). However, one study found no difference in thresholds between North American whites and blacks (in Zatzick and Dimsdale, 1990). The racial lineage of the blacks and whites in these studies were not mentioned, including the degree of white ancestry of the blacks.

Multiple racial comparisons are rare. A study that examined three races compared tolerance to a noxious tendon pinch and found that whites had the highest tolerance, followed by blacks and then Asians (Woodrow et al., 1972). The racial ranking was similar in both males and females. In addition, Woodrow et al. (1972) found that the racial differences in pain thresholds persisted irrespective of age and levels of educational attainment.

Future studies should be performed to examine pain thresholds

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and tolerance to other stimuli such as heat or cold. Studies should also be performed in other multiracial nations, to test the ranking of whites, blacks and Asians in pain perception.

A second approach to evaluating racial differences in pain perception is by examining clinical pain, in patients with disease (e.g. cancer) and in patients following surgery (e.g. dental procedure). A common method in clinical studies of assessing pain is by patient rating or self-reporting. One study examined self-reported pain-related anxiety of North American Whites, blacks and Puerto Ricans (Weisenberg et al., 1975). Detailed information on racial characterization in this study was not supplied. Whites and blacks were more likely to tolerate anxiety related to dental pain than Puerto Ricans. Also, anxiety due to pending dental treatment was lower in Whites compared to Puerto Ricans, with Blacks intermediate in pain-related anxiety. In a different study, native Chinese myocardial infarct patients reported more chest pain than white American patients (Wang and Fallon, 1990). In parallel with this observation is that about one-third of American patients did not complain of chest pain, whereas only 18% of Chinese patients denied pain. Another study which examined qualitative differences in back pain, comparing black and white patients (Garron and Leavitt, 1979). White back pain patients reported more constant burning and bright pressure sensations than black patients. Across various conditions, it appears that whites have higher pain thresholds than blacks and Asians. What may be important in addition to pain tolerance are measures of the quality and reaction to pain.

The racially distinct prevalence of painful pathologies may suggest differential pain processing. For example, whites have an almost 2-fold higher prevalence of tension-type headache and migraine than blacks (Martin et al., 1994; Schwartz et al., 1998). Further examination of the mechanism of these pain states may lead to uncovering of racial differences in physiology, and, ultimately, racial genetic differences.

An indirect method of examining differences in pain behavior is to examine the efficacy of analgesics. People who are more sensitive to pain may require more than the usual amounts of analgesics. Since blacks require more opiate analgesic, compared to whites, Hispanics and Asians, to control post-operative pain, it is implied that blacks are more sensitive to painful stimulation (Ng et al., 1996). In

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this study, morphine was delivered by a patient controlled analgesia device, which allows patients to self-administer as much analgesic as required to provide pain relief. All racial groups reported similar levels of pain relief, indicating that the patients were competent in the use of the device. Similarly, black women are the most frequently users of narcotics for labor pain, followed by whites, then Asians (Albers, 1998). To support the contention that (American) Asians may have higher pain thresholds, Albers pointed out that almost 40% of Asians chose non-pharmacological labor pain management (e.g. paced breathing), whereas only about 24% of blacks used this method.

Other studies have reported that whites use more opiate analgesic than Asians following surgery, suggesting that opiates are more efficacious in Asians than in other races (Streltzer and Wade, 1981; Houghton et al., 1992). Racial sensitivity to opiate analgesic in chronic pain patients does not appear to parallel that in acute situations. With an 8 mg dose of morphine, "Oriental" cancer pain patients report the most analgesia compared to blacks and whites (Kaiko et al., 1983). However, in contrast to acute pain findings, blacks reported greater analgesia that whites with 8 mg of morphine. Body weight and age could not account for the differences. The apparent differential racial sensitivity to analgesics like opiates needs to be further evaluated under other clinical settings. In the acute pain state, such as that following surgery, blacks appear to have the highest requirement for analgesics, followed by whites, then Asians. In a chronic pain state, however, it appears that whites have the highest need for analgesics, followed by blacks, then Asians. Some of the disparity in sensitivity to analgesics may be related to racial differences in pharmacokinetics or metabolism (Zhou et al.,1993). Other possibilities include racial differences in receptor sensitivity and neurochemical responses to opiates in the acute *vs.* the chronic pain state. Further investigation should confirm the racial differences, then characterize the genes that mediate differences in opiate analgesia. A racial-genetic difference in opiate sensitivity has important therapeutic implications.

Due to practical and ethical restraints, racial differences in pain and their genetic source are examined in animal pain models. Intriguing data have been garnered.

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Experimental evidence: genetic influence of animal behavior: All rats are not equal

The animal literature has demonstrated generally consistent effects of analgesics on noxious stimuli. However, careful comparison between studies reveal significant variability of the baseline pain behaviors as well as the effect of analgesics. Differences persist even after controlling for factors such as stimulus intensity and housing condition. The source of variability has been narrowed to the use of various strains or substrains of rodent. Indeed, strain differences have been observed in behaviors, including learning and memory, mother-infant interaction and anxiety (Ts'o, 1975; Ammassari-Teule, 1993; Trullas and Skolnick, 1993; Moore, 1997). Research has also uncovered strain differences in drug seeking behavior in rats. Lewis rats appear more sensitive to the addictive effect of cocaine compared to Fischer rats. The pharmacokinetics of cocaine in these rats are similar, so the increased responsiveness to cocaine in the Lewis rats may be due to an increased sensitivity or activity of the brain's reward center activated by cocaine (Kosten, 1997). The differences in behavior observed in rodents may be due to a difference in brain function, which point to genetic differences (Bentivoglio et al., 1994; Symons et al., 1988). Since rodents in many studies were raised under similar conditions, the influence of environment is likely to be minimal. The strain differences in behavior are not only of considerable experimental importance, but also have implications for racial behavioral differences.

Recently, a study was performed that minimized environmental variability and evaluated various pain behaviors of 11 strains of mice (Mogil et al., 1998, 1999a). In general, some mice strains were more sensitive to noxious heat than others, whereas other strains had high heat tolerance. Mogil et al. then used several kinds of noxious heat tests (e.g. testing responsiveness of the tail or paw). An interesting finding was that the responses of the mice varied when assessed with the various noxious tests. The correlation between different tests (e.g. chemical *vs.* thermal pain) was low, whereas the correlation between two similar tests that utilized noxious heat was about 0.9 (Mogil et al., 1999b). It should not be too surprising that responses may differ occur depending on the test used. However, the correlations, when presented on a multidimensional scaling plot, formed a cluster, in that tests that utilized heat formed a cluster (and correlations from other

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tests such as chemically-induced pain, were another cluster). Thus, it may be speculated that the genes of the heat sensitive mice may differ from those that are heat tolerant. Also, tests of different sensory modalities may be activating different pathways. Future studies will attempt to identify the genes underlying the differential responsiveness to painful stimuli using molecular biological techniques.

In addition to the differential sensitivity to noxious stimuli, rodents are differentially sensitive to the analgesic effect of opiates. Studies have demonstrated varying effects of opiates between rodent strains (Sudakov, 1996; Mogil, 1996). Mogil et al. (1996) found significant differences, of opiate efficacy and potency, in several mouse strains. Differences persisted across various pain tests. Interestingly, an inverse correlation was demonstrated between sensitivity to a noxious stimulus and analgesic efficacy of morphine. In other words, the dose response curve of mice highly sensitive to a noxious stimulus was to the right of those mice which were more tolerant to the same stimulus (Mogil et al., 1996; Elmer et al., 1998). One source of the differences in the responses to analgesics is a differential functioning of endogenous analgesic system, which is usually activated in times of stress and external stimuli. In animals, the analgesic system is comprised of inhibitory ligands and receptors, which are found in areas of the brain that are involved in pain perception. Differences in brain opiate pharmacology, such as receptor numbers and peptide levels, have been observed between strains of mice (Frishchknecht et al., 1988; Shuster, 1989; Mogil et al., 1996; Mogil et al., 1997; Winkler and Spanagel, 1998). Some of the data suggest that a positive correlation between opiate receptor number and analgesic effect of morphine, but this needs to be further tested. Also, the relevance of other receptors and transmitters to behavior needs to be established.

The rodent studies suggest at least two clinical implications for humans, that the races may differ in pain sensitivity and in responsiveness to analgesics and that these differences are genetically mediated. The data above tend to support the clinical findings, where blacks seem to be more sensitive to acute painful stimuli and are less sensitive to opiate analgesics compared to Asians (in America), and Asians have higher pain tolerance and are more sensitive to opiates. More observations, under pain states due to

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disease or post-operative pain and the effect of various types of analgesics, are needed to confirm racial differences in pain perception and analgesic efficacy.

Evolutionary Strategy?

Organisms have evolved various "life histories," strategies to ensure the perpetuation of their kind. The strategies can be characterized as either *r* or K. High *r*-strategies include high rate of reproduction, low investment on offspring upbringing and rapid maturation. In contrast, high K strategies include low rate of reproduction and high investment in offspring upbringing and slow maturation. The races markedly differ in reproductive strategies, that is, Asians are more K-selective than whites. Blacks are more *r*-selective than whites and Asians. Rushton (1995) has suggested that the racial differences in behavior, particularly intelligence, are a consequence of the racial difference in evolutionary strategy. The racial difference in pain perception may also be explained by *r*-K strategy. Although speculative, the high pain tolerance of Asians and whites is a result of early life in northern Asian and Europe. Traits such as long-range goal setting and patience were highly favorable for those who lived in the harsh climates. High pain tolerance, in combination with such behaviors as self-discipline, may have also been an essential survival trait for this region. However, in the more temperate African climates, life was not so formidable, encouraging less rigorous behavior than those of northern Eurasia. Thus, the ability to withstand pain was not important for people in Africa. Furthermore, enduring pain may hinder self-gratification and multiple sexual encounters. So, rather than withstand pain, pain was something to be actively avoided. High pain tolerance would be K-selective and low pain tolerance would be *r*-selective. Additional investigation of pain perception in early humans should shed light on its evolutionary and genetic significance.

Consequences of Differential Responsiveness to Pain

Pharmacologic and physiologic variability observed between strains of mice suggest that genes mediate these differences. The animal data raise the possibility that racial differences in human pain perception are also, in part, genetically mediated. Testing of this hypothesis should start with collection and evaluation of human pain

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behavior. In parallel with describing racial differences in pain behavior, characterization of the human pain neurochemistry should be pursued. This would include assessment of brain receptor number and function and neurotransmitter type and levels in brain regions involved in pain modulation. Non-invasive imaging technology will enable the collection of anatomical and functional data.

Genetic analysis has been applied to animals in examining the genetics of pain. As previously mentioned, Mogil et al. (1999a) have uncovered strain differences in pain perception, which suggests genetic mediation. Mogil et al. (1997) are currently trying to identify pain-related genes. In another study, rats were selectively breed to show either a high or low degree of self-directed injury behavior (autotomy) following peripheral nerve transection. Crossing of the homozygous high and low autotomy rats yielded hybrids that displayed low autotomy following nerve injury, which demonstrates, the author suggested, that autotomy is a recessive trait. Backcrossing the hybrids to the high autotomy resulted in 50% high autotomy and 50% low autotomy rats. The authors concluded that the pain behavior following nerve injury was mediated by a single-gene autosomal recessive trait (Devor and Raber, 1990). Thus, the combination of genetic and behavioral analysis is a powerful technique in elucidating the role of genes in pain behavior.

In a similar manner, it should be possible to use genetic analysis to identify the genes involved in human pain behavior. This knowledge may enable us to diagnose people who are at risk of developing chronic pain that accompanies disease or injury. The differential responsiveness of pain to analgesics may occur in several ways, such as activation of a racially unique gene following injury or alteration that occurs only in some races of a gene found in all races (e.g. splice variant). For example, there is significant polymorphism of the preproenkephalin A gene in Asians, blacks and whites (Chan et al., 1994). A higher frequency of the preproenkephalin A gene have been reported in heroin addicts, compared to non-narcotic addicts and non-addicts (Comings et al., 1999). The gene product enkephalin is involved in modulating pain and other behaviors, but the functional consequences of changes in the enkephalin gene in humans are unknown. Comparison of the enkephalin gene and levels of enkephalin and correlating these with behaviors, such as pain sensitivity and sensitivity to opiate analgesics, should shed some

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insight in the function of the gene in behavior and the consequence of alterations of the gene on behavior.

The search for human genes and gene products that are related to pain behavior has already yielded results, but their significance in pain behavior is unclear. A report has noted that patients who suffer from reflex sympathetic dystrophy (RSD), a particularly debilitating pain state that persists long after injury has resolved, have high levels of DR2(15) major histocompatibility complex antigen (Mailis and Wade, 1994). A survey completed by the Reflex Sympathetic Dystrophy Association points to white females of Northern European descent are more prone to suffer RSD, compared to blacks and Asians (Mailis and Wade, 1994). The increase of an immunologically-related marker is similar to that observed in patients with multiple sclerosis, which raises the intriguing possibility that a chronic pain state such as RSD involves neuro-autoimmune dysfunction (Mailis and Wade, 1994). However, the exact role of DR2(15) in chronic pain and its increased expression in white RSD patients remains to be elucidated. Treatment for RSD is not uniformly successful across patients. Phentolamine, an a-adrenergic receptor antagonist, has shown mixed results when used to diagnose and treat RSD. The variable effect of phentolamine may be due to differences in adrenergic receptor function in RSD patients. Lee et al. (1997) demonstrate that some rat strains with an RSD-like pain state will respond to phentolamine whereas other strains do not. This suggests that race may have a role in the variability of phentolamine's effect. Comparison of human adrenergic receptor function and genes between races may yield insight into the source of phentolamine's variable effect.

As is the case for many types of human behavior, there are individual and group differences in behavior and these variabilities may be due to genetic differences. Genetic differences may also underlie variability in pain perception. It is likely that numerous genes will be identified that are involved in pain behavior. Uncovering these genes and relating them to a role in normal pain perception and the chronic pain state will further our understanding of the mechanism of pain. Identification of pain-related genes may also have a significant impact on developing novel treatment for pain.

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ELECTRONIC REPRODUCTION PROHIBITED

References

Albers, L.
1998 Midwifery management of pain in labor: The CNM data group. *J. Nurse-Midwifery* 43: 77-82

Ammassari-Teule, M., Hoffmann, H.J., Rossi-Arnaud, C.
1993 Learning in inbred mice: strain-specific abilities across three radial maze problems. *Behav. Gen.* 23: 405-412.

Baker, J.R.
1974 Race. Oxford University Press: London.

Bentivoglio, A.R., Altavista, M.C., Granata, R., Albanese, A.
1994 Genetically determined cholinergic deficiency in the forebrain of C57BL/B mice. *Brain Res.* 637: 181-189.

Bonica, J.J.
1990 The Management of Pain. Lea and Fibiger: Malvern, PA

Chan, R.J., McBride, A.W., Thomasson, H.R., Ykenney, A., Crabb, D.W.
1994 Allele frequencies of the preproenkephalin A (PENK) gene CA repeat in Asians, African –Americans, and Caucasians: lack of evidence for different allele frequencies in alcoholics. *Alcohol Clin. Exp. Res.* 18: 533-535.

Chapman, C.R., Sato, T., Martin, R.W., Tanaka, A., Okazaki, N., Colpitts, Y.M., Mayeno, J.K., Gagliardi, G.J.
1982 Comparative effects of acupuncture in Japan and the United States on dental pain perception. *Pain* 12:319-28.

Chen, A.C.N., Dworkin, S.F., Haug, J., Gehrig, J.
1989 Human pain responsivity in a tonic pain model: psychological determinants. *Pain* 37: 143-160.

Comings, D.E., Blake, H., Dietz, G., Gade-Andarolu, R., Legro, R.S., Saucier, G., Johnson, P., Verde, R., MacMurray, J.P.
1999 The proenkephalin gene (PENK) and opioid dependence. *NeuroReport* 10: 1133-1135.

Devor, M., Raber, P.
1990 Heritability of symptoms in an experimental model of neuropathic pain. *Pain* 42:51-67.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Edwards, R.R., Fillingim, R.B.
1998 Racial differences in thermal pain responses. *Amer. Pain Soc. Abstr.* 17: 156.

Elmer, G.I., Pieper, J.O., Negus, S.S. and Woods, J.H.
1998 Genetic variance in nociception and its relationship to the potency of morphine-induced analgesia in thermal and chemical tests. *Pain* 75: 129-140.

Frischknecht, H.R., Siegfried, B. and Waser, P.G.
1988 Opioids and behavior: genetic aspects. *Experimentia* 44: 473-481.

Garron, D.C., Leavitt, F.
1979 Demographic and affective covariates of pain. *Psychosom. Res.* 41: 525-534.

Greenblum, J.
1974 Medical and health orientations of American Jews: a case of diminishing distinctiveness. *Soc. Sci. Med.* 8:127-34.

Houghton, I.T., Aun, C.S.T., Lau, J.T.F.
1992 Inter-ethnic differences in postoperative pethidine requirements. *Anaesth. Intes. Care* 20: 52-55.

Kaiko, R.F., Wallenstein, S.L., Rogers, A.G., Houde, R.W.
1983 Sources of variation in analgesic responses in cancer patients with chronic pain receiving morphine. *Pain* 5:191-200.

Knox, V.J., Shum, K., McLaughlin, D.H.
1977 Response to cold pressor pain and to acupuncture analgesia in oriental and occidental subjects. *Pain* 4: 49-57.

Kosten, T.A., Miserendino, M.J., Haile, C.N., DeCaprio, J.L., Jatlow, P.I., Nestler, E.J.
1997 Acquisition and maintenance of intravenous cocaine self-administration in Lewis and Fischer inbred rat strains. *Brain Res.* 778: 418-429.

Lee, D.H., Chung, K., Chung, J.M.
1997 Strain differences in adrenergic sensitivity of neuropathic pain behaviors in an experimental rat model. *NeuroReport* 8: 3453-3456.

Mardy, S., Miura, Y., Endo, F., Matsuda, I., Sztriha, L., Frossard, P., Moosa, A., Ismail, E.A., Macaya, A., Andria, G., Toscano, E., Gibson, W., Graham, G.E., Indo, Y.
1999 Congenital insensitivity to pain with anhidrosis: novel mutations in the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

TRKA (NTRK1) gene encoding a high-affinity receptor for nerve growth factor. *Am. J. Hum. Genet.* 64:1570-1579.

Mailis A., Wade J.
1994 Profile of caucasian women with possible genetic predisposition to reflex sympathetic dystrophy: a pilot study. *Clin. J. Pain* 10: 210-217.

Martin, B.C., Dorfman, J.H., McMillan, J.A., McMillan, C.A.
1994 Prevalence of migraine headache and association with sex, age, race, and rural/urban residence: a population-based study of Georgia Medicaid recipients. *Clin. Therap.* 16: 855-872.

Melzack, R., Wall, P.D.
1982 The Challenge of Pain. Basic Books: New York.

Mogil, J.S., Sternberg, W.F., Marek, P., Sadowski, B., Belknap, J.K., Liebeskind, J.C.
1996 The genetics of pain and pain inhibition. *Proc. Natl. Acad. Sci. USA.* 93: 3048-3055.

Mogil, J.S., Richards, S.P., O'Toole, L.A., Helms, M.L., Mitchell, S.R., Belknap, J.K.
1997 Genetic sensitivity to hot-plate nociception in DBA/2J and C7BL/6J inbred mouse strains: possible sex-specific mediation by delta2-opiate receptors. *Pain* 70: 267-277.

Mogil, J.S., Lichtensteiger, C.A. and Wilson, S.G.
1998 The effect of genotype on sensitivity to inflammatory nociception: characterization of resistance (A/J) and sensitive (C57BL/6J) inbred mouse strains. *Pain* 76:115-125.

Mogil, J.S., Wilson, S.G., Bon, K., Lee, S.E., Chung, K., Raber, P., Pieper, J.O., Hain, H.S., Belknap, J.K., Hubert, L., Elmer, G.I., Chung, J.M. and Devor, M.
1999a Heritability of nociception I: responses of 11 inbred mouse strains on 12 measures of nociception. *Pain* 80:67-82.

Mogil, J.S., Wilson, S.G., Bon, K., Lee, S.E., Chung, K., Raber, P., Pieper, J.O., Hain, H.S., Belknap, J.K., Hubert, L., Elmer, G.I., Chung, J.M., Devor, M.
1999b Heritability of nociception II. 'Types' of nociception revealed by genetic correlation analysis. *Pain* 80:83-93.

Moore, C.L., Wong, L., Daum, M.C., Leclair, O.U.

LICENSED TO UNZ.ORG
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1997 Mother-infant interactions in two strains of rats: implications for dissociating mechanism and function of a maternal patter. *Dev. Psychobiol.* 30: 301-312.

National Science Foundation
1994 Women, Minorities, and Persons with Disabilities in Science and Engineering: 1994. National Science Foundation: Arlington, VA.

Ng, B., Dimsdale, J.E., Rollnik, J.D., Shapiro, H.
1996 The effect of ethnicity on prescriptions for patient-controlled analgesia for post-operative pain. *Pain* 66: 9-12.

Rushton, J.P.
Race Evolution and Behavior. Transaction Press: New Brunswick, NJ.

Schwartz, B.S., Stewart, W.F., Simon, D., Lipton, R.B.
1998 Epidemiology of tension-type headache. *J. Amer. Med. Assn.* 279: 381-383.

Shuster, L.
1989 Pharmacogenetics of drugs of abuse. *Ann. N.Y. Acad. Sci.* 562:56-73.

Streltzer, J., Wade, T.C.
1981 The influence of cultural group on the undertreatment of postoperative pain. *Psychosom. Med.* 43:397-403.

Sudakov, S.K., Borisova, E.V. and Lyupina, Y.V.
1996 Influence of inheritance and fostering on sensitivity to effects of morphine on nociception and locomotor activity in two inbred rat stains. *Neuropharmacol.* 35: 1131-1134.

Symons, J.P., Davis, R.E., Marriott, J.G.
1988 Water-maze learning and effects of cholinergic drugs in mouse strains with high and low hippocampal pyramid cell counts. *Life Sci.* 42: 375-383.

Trullas, R., Skolnick, P.
1993 Differences in fear motivated behaviors among inbred mouse strains. *Psychopharmacol.* 111: 323-331.

Ts'o, T.O., Baker, S.J., Noble, N.A., Brewer, G.J.
Differences in developing the lever-pressing behavior in two strains of rats. *Physiol. Behav.* 14: 719-723.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Wang, S.-W., Fallon, J.T.
1990 A clinicopathologic comparison of acute myocardial infarction in the elderly Chinese and American. *Chinese Med. J.* 103: 110-116.

Weisenberg, M., Kreindler, M.L., Schachat, R, Werboff, J.
1975 Pain: anxiety and attitudes in black, white and Puerto Rican patient. *Psychosomatic Med.* 37: 123-135.

Winkler, A., Spanagel, R.
1998 Differences in the kappa opioid receptor mRNA content in distinct brain regions of two inbred mice strains. *NeuroReport* 9: 1450-1464

Woodrow, K.M., Friedman, G.D., Siegelaub, A.B., Collen, M.F.
1972 Pain tolerance: differences according to age, sex and race. *Psychosomatic Med.* 34: 548-556.

Yanovski, J.A., Yanovski, S.Z., Cutler, G.B., Chrousos G.P., Filmer, K.M.
1996 Differences in the hypothalamic-pituitary-adrenal axis of black girls and white girls. *J. Pediatrics* 29: 130-135.

Zatzick, D.F., Dimsdale, J.E.
1990 Cultural variations in response to painful stimuli. *Psychosomatic Med.* 52: 544-557.

Zhou, H.H., Sheller, J.R., Nu, H., Wood, M., Wood, A.J.
1993 Ethnic differences in response to morphine. *Clin. Pharmacol. Ther.* 54:507-513.

Zborowski, M.
People in Pain. Jossey-Bass: San Francisco.

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ELECTRONIC REPRODUCTION PROHIBITED

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Form and Race: Terminological Concepts for the Study of Human Variation

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The author notes the debate amongst Western anthropologists concerning the various ways in which term 'race' can be used in scientific writing, and refers to animal taxonomy in an attempt to determine principles on which universal paradigmatic principles governing scholarly usage of the term might be based. As amongst anthropologists, animal taxonomists used the term 'race' in two different ways, sometimes as equivalent to 'subspecies' and sometimes as synonymous with 'breeding population.' However, some taxonomists use the term 'form' when referring to identifiable and distinctive populations linked to other populations by genetic clines, and it is suggested that much confusion might be avoided if anthropologists applied the term 'race' only to genetically discrete and clearly distinctive 'breeding populations,' using the broader term 'form' when seeking to classify humankind at large on the basis of such identifiable phenotypical characteristics as may best serve their specific research goals.

Key Words: Race, form, sub-species, animal taxonomy, breeding populations.

The study of human biological variation has had a long and controversial history. After lengthy study, numerous misunderstandings of a scientific and extra-scientific nature still surround this field of research. It has been argued several times in the past (J. S. Huxley and Haddon, 1937; Montagu, 1951, 1965a, 1972; Garn and Coon, 1955) that some of these might be resolved by introducing terminological changes. Using this strategy, it will be proposed in this paper that, in line with the practices of animal taxonomy, the neutral term 'form' should be introduced into the study of human variation. The term 'race,' which has hitherto been used in a somewhat wide range of senses, might still be utilized in scientific terminology when

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applied to distinct 'breeding populations'. In order to justify this suggestion, a brief review of the recent history and the present state of research on human variation is in order.

The debate over the concept of race reached its peak in the early 1960s. New approaches to the study of human variation arose and were discussed as substitutes for the racial typology which was burdened with scientific anomalies and, not uncommonly, negative political and social implications. In somewhat simplified terms, it may be said that scientists were divided into two opposing camps. On the one side were those who argued for the demise of the very concept of race (see, above all, Livingstone, 1962; Brace 1964; Montagu, 1965) while on the other were those who thought that the concept of race should not be abandoned but redefined in terms of population genetics (see, especially, Garn, 1961; Dobzhansky, 1962; Newman, 1963). A lengthy and intense polemic between representatives of the two approaches produced no agreement on the matter.

In the USA a team of scientists from Central Michigan University has assessed the prevailing attitudes of anthropologists to the concept of race since the 1960s (see Lieberman and Reynolds, 1996, for a resumé). Their results indicated a significant shift toward abandonment of the term in scientific discourse, although by the late 1980s American biological anthropologists supporting the scientific validity of the term and its continued use were still marginally a majority (Lieberman et al., 1989). There is no doubt that due to other internal and external reasons, such as the broadening of interest within the field of biological anthropology and a social atmosphere that seemed to favor interest in human universals rather than differences, the utilization of the race concept was becoming less common in anthropological literature from the early seventies onwards (Lieberman and Reynolds, 1996; Cartmill, 1998). Interest in the conceptual analysis of 'race,' which was common during the debate of the early sixties and earlier, also seems to have declined among anthropologists.

However, it would appear that the has nineties witnessed a revival of the concept of race, not only in biological anthropology but in other scientific disciplines (Shipman, 1994; Goodman and Armelagos, 1996; Lieberman and Reynolds, 1996). One of the signs of this is the decision of the Association of American Physical Anthropologist to issue a 'Statement on the Biological Aspects of

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Race' as an update to the UNESCO 1964 'Statement on Race' (Montagu, 1972). This was formulated and published in 1996. That the subject is still a matter of contention is obvious from the fact that a previous attempt at formulating an AAPA statement in 1993 was unsuccessful (Sirianni, 1993). Additions to or updating of the UNESCO Statement have also been discussed by other respected institutions and individuals (see Chiarelli, 1995; Tobias, 1997).

It seems reasonable, therefore, to attempt to reexamine the crucial concepts and terminological apparatus used in the study of the nature and origin of human variation to see if it is possible for anthropologists to reach a consensus.

'Race', it must be stressed, is a biological term; and human races, if the concept is to be applied to humans, should be defined by biological anthropologists. This is important not only in order to facilitate communication between biological anthropologists, but also for the benefit of scientists from other fields interested in the problems associated with biological variation among *Homo sapiens*. The latter, it would appear, often adopt terminology without taking note of differing or contradictory usages in contemporary and older anthropological literature, or use terms in their own (often non-biological) way, thereby increasing confusion within both scientific and public discourse (Štrkalj, 1997). Some standard reference works do not seem to be helpful, either. The third edition of the *Oxford Dictionary of Biology* (1996: R1), for example, defines race (as applied in anthropology) in a rather obsolete way as: "different *types* of *man*" (emphasis added). As Relethford (1995: 91) observed recently: "[r]ace is in the public eye again, and once more the biological anthropologist must address problems with racial taxonomy and the related misapplication of evolutionary theory."

If *Homo sapiens* is indeed just another unique animal species (Foley, 1987), then there is no reason, when we study its variation, not to follow principles of animal taxonomy and its terminology (Hull, 1998). This principle was recognized early in anthropology's history (Blumenbach, 1790), but has not always been followed. What is more, it does not provide a 'ready-to-use' solution, as there is controversy concerning infraspecific classification among animal taxonomists as well. Indeed, one important reason for questioning the concept of race in anthropology was the fact that the specific definition of the term "subspecies" was being questioned in biology

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(Wilson and Brown, 1953). One can therefore refer to animal taxonomy only for broad guidelines rather than any definitive resolution.

In point of fact, the only formal category of classification in animal taxonomy below the species level is 'subspecies,' although there are also several non-formal categories of which the most commonly utilized is 'race.' In animal taxonomy, 'race' is often used with qualifying adjectives such as geographic, microgeographic, local, ecological, etc. (Tobias, 1985). There are, however, two different basic senses in which 'race' is used in general taxonomy: (1) as a term equivalent to and interchangeable with "subspecies", and (2) for classification below the subspecies level – that is, to signify "local populations within subspecies" (Mayr, 1969: 44).

As Synonymous with 'Breeding Population"

In relation to the study of human variation it would be profitable to start from a point on which most anthropologists agree. When it comes to classifying *Homo sapiens* it would appear that it is universally or nearly universally accepted that a breeding population is a reasonable unit of classification in the study of human variation. It can be claimed that the clinal approach, which basically denies attempts at specific classification, offers better results when applied to living human populations (Molnar, 1998). It is therefore reasonable to suggest that when the term 'race' is employed by anthropologists it might be useful to restrict its meaning to breeding populations.

Using the term in this sense is by no means strange to taxonomical practice and it is subsumed by the above-mentioned usage of race as 'local population'. In several influential biological texts, race is defined precisely in this way. Dobzhansky (1951: 138), for example, defined races as "Mendelian populations of a species which differ in the frequencies of one or more genetic variants, gene alleles, or chromosomal structures."

One may ask why the term 'race' is used at all if it is a synonym for 'breeding population' (see Montagu, 1965a): why not just use 'breeding population'? Lieberman and Jackson (1995: 234) seem to agree: "[n]othing is gained by the use of *race* that the term *population* cannot serve equally well." But one must bear Darwin's (1871: 227) warning in mind, however, that "from long habit the term 'race' will perhaps always be employed". The habit is now even longer-lasting

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and more complex (inside and outside of anthropology), notwithstanding all the recent efforts to discard both the concept and the term. Therefore, it seems that to retain the term in anthropological terminology might make sense. The crucial issue is not whether the term 'race' is to be used or not, but rather that if it is to be used, that it should be used in a consistent sense, and whether it might not be used as a synonym for 'breeding population.'

As Synonymous with Subspecies

Major disagreements about the classification of humankind, as is well known, concern the other way in which the term race is used in taxonomy; e.g. as a synonym for 'subspecies.'

According to Mayr's (1963: 348) classical definition, "a subspecies is an aggregate of local populations of a species, inhabiting a geographic subdivision of the range of the species, and differing taxonomically from other populations of the species." The question is, therefore, whether it is possible to make a meaningful grouping within the species *Homo sapiens* above the level of breeding populations. Hiernaux (1965: 32), for example, emphasized: "[t]o me, as to many others, it seems that the only useful way of grouping individuals for anthropological analysis is to group together the people participating within the same circle of matings." This, as Hiernaux remarked, was true for many but certainly not for all anthropologists – and, as studies made by the group from Central Michigan University suggest, not even for a majority.

Tt would appear that in certain instances it can be useful to group populations in larger units according to the needs of the particular research. An important hypothesis on the origin of modern humans, for example, that of Multiregional Continuity, is almost impossible to present without such a division. This is true in spite of factors that make the division of *Homo sapiens* difficult, such as discordance of traits and clinal distribution. But the obvious lack of agreement on the classification of humankind should not be taken as a serious objection to classification itself. It is to be expected that differences would occur when one considers that the object of study is so complex, being a species with global distribution and a complicated history of migrations. Furthermore, a substantial amount of relevant data are missing. Thus, notwithstanding huge advances in biological science, Count's (1951: xix) observation that "[t]he science

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of man [and anthropology is 'dawn-science,' of man] is very, very young" is still applicable.

Finally, different researchers concentrate on different aspects of the problem. Eldredge's (1993: 4) remark concerning the concept of species may also be applied to studies at the subspecific level: "biologists of varying perspective indeed 'see' different sorts of species in biotic nature (and, epistemologically, even in the same data set) but do so, at least in part, not out of slavish adherence to a particular theoretical perspective but because biotic nature is indeed 'packaged' into discrete or quasi-discrete entities of different sorts."

In a complicated situation, such as undoubtedly characterizes the study of variation among *Homo sapiens*, it would appear that the most acceptable solution is to use neutral terms. These terms can be applied informally to phena especially in unclear situations (Mayr, 1969). Montagu (1963) argued that the term and the concept of race (meaning subspecies) should be abandoned. Among the reasons he gave for advocating its disuse was the claim that on the basis of available data it was not certain whether humanity was classifiable into discrete races. One hundred years before Montagu, T. H. Huxley [1865] advanced similar reasons for preferring to use terms such as 'persistent modifications' and 'stocks' in place of 'races,' 'varieties' or even 'species'. The implication was that to use the term 'race' would therefore be to jump to conclusions. Montagu (1951, 1963, 1974), like J. S. Huxley and Haddon (1937) before him, proposed the use of the term 'ethnic group' as a substitute for 'race'. However, this term seemed to be not only vague (which Montagu took as its major advantage) but ambiguous, as it implied, among other things, that cultural differences were to be taken into account, which is unacceptable if human variation is to be studied biologically. The possible use of 'ethnic group' was therefore criticized by both those who agreed with Montagu's critique of the concept of race (Brace, 1964) and those who opposed it (see, among many others, Count, 1951; Garn, 1961; Kuttner, 1967). Other proposals, such as J. S. Huxley's neologism 'genogroup' (Montagu, 1965a), which is certainly a much better suggestion than 'ethnic group,' never gained significant attention.

It would appear that there is no need to introduce terms used in other sciences or to invent neologisms when non-committal, i.e. neutral, terminology already exists in animal taxonomy. In the case of

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the infraspecific classification of *Homo sapiens*, the term 'form' is already available. Mayr (1969: 403) defines 'form' as "a neutral term for a single individual, phenon, or taxon." It is used in zoology when it is not certain whether species, subspecies or some lesser category is appropriate. Whether one uses the concept of form and into how many forms one might divide humanity should be, as Dobzhansky (1962) argued (for 'races'), a matter of convenience. Vernacular names, which have been in use for a long time, might be used to designate them.[2]

The terminological suggestions presented are simple and non-committal. By stressing points of agreement instead of difference, they become a compromise between the two approaches to the study of human variation. 'Breeding population' should be taken as the basic unit for the study of human variation, and where the term 'race' is used it should be used to refer to 'breeding populations'. Where a researcher finds it profitable to identify infraspecific groupings larger than breeding populations, the neutral term 'form' may be preferred because of the complexity of the wider patterns of human variation, the (still) insufficient data available, and the divergent aims of different studies. For the same reasons, the number of forms the researcher may choose to identify should likewise be a matter of convenience.

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References

AAPA statement on biological aspects of race.
1996 *American Journal of Physical Anthropology* 101:569-570.

[2] Whether the future will bring the general acceptance of the classification of past or present *Homo sapiens* into subspecies, or conclusively demonstrate that such classification is futile, is impossible to say. But in the event that the answer is affirmative – as, for example, Coon (1965) predicted – the formal term 'subspecies' should be used instead of 'form', while 'race' could still be utilized with the meaning of 'breeding population' if not the terminology discussed here may still be used.

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ELECTRONIC REPRODUCTION PROHIBITED

BLUMENBACH J. F.
1790 *Beitrage zur Naturgeschichte*. Gottingen: Dieterich.
BRACE C. L.
1964 On the race concept. *Current Anthropology* 5:313-320.
BRACE C. L.
1982 Comment. *Current Anthropology* 23:648-649.
CARTMILL M.
1998 The status of the race concept in physical anthropology. *American Anthropologist*: 100:651-661.
CHIARELLI B.
1995 Man Between Past and Future. Washington, D.C.: The Institute for the Study of Man.
COON C. S.
1965 *The Living Races of Man*. New York: Alfred A. Knopf.
COUNT E. W.
1951 "Introduction" in *This is Race*. Edited by E. W. Count, pp. xii-xxviii. New York: Henry Schuman, pp. xii-xxviii.
COUNT E. W.
1951a Discussion of "A consideration of the concept of *race*" by M. F. Ashley Montagu. *Cold Spring Harbor Symposia on Quantitative Biology* 15:335.
DARWIN C. 1871 *The Descent of Man, and Selection in Relation to Sex*. London: Murray.
DOBZHANSKY T.
1951 *Genetics and the Origin of Species*. 3rd ed. New York: Columbia University Press.
DOBZHANSKY T.
1963 *Mankind Evolving*. New Haven and London: Yale University Press.
ELDREDGE N.
1993 "What, if anything, is a species?" in *Species, Species Concepts, and Primate Evolution*. Edited by W. H. Kimbel and L. B. Martin, pp. 3-20. New York: Plenum Press.
FOLEY R.
1987 *Another Unique Species: Patterns in Human Evolutionary Ecology*. London: Longman.
GARN S.
1961 *Human races*. Springfield: C. C. Thomas.
GARN S. M., AND C. S. COON.
1955 On the number of races of mankind. *American Anthropologist* 57: 996-1001.
GOODMAN A. H., AND G. J. ARMELAGOS.
1996 "Race, racism and new physical anthropology," in *Race and Other Misadventures: Essays in Honor of Ashley Montagu*. Edited by L. T. Reynolds and L. Lieberman, pp. 172-186. Dix Hills: General Hall

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Publishers.

HIERNAUX J.
1965 "The concept of race and the taxonomy of mankind," in *The Concept of Race*. Edited by A. Montagu, pp. 29-45. New York: Free Press of Glencoe.

HULL D.
1998 Species, subspecies and races. *Social Research* 65:351-367.

HUXLEY J. S., AND A. C. HADDON.
1936 *We Europeans: a Survey of "Racial" Problems*. New York: Harper and Bros.

HUXLEY T. H.
1865 On the methods and results of ethnology. *Fortnightly Review* 1:257-277.

KUTTNER R. E.
1967 "Introduction," in *Race and Modern Science*. Edited by R. E. Kuttner, pp. xiii-xxi. New York: Social Science Press.

LIEBERMAN L., AND F. L. C. JACKSON.
1995 Race and three models of human origin. *American Anthropologist* 97:232- 242.

LIEBERMAN L., AND L. T. REYNOLDS.
1996 "Race: the deconstruction of scientific concept," in *Race and Other Misadventures: Essays in Honor of Ashley Montagu*. Edited by L. T. Reynolds and L. Lieberman, pp. 142-173. Dix Hills: General Hall Publishers

LIEBERMAN L., B. W. STEVENSON, AND L. T. REYNOLDS
1989 Race and anthropology: a core concept without consensus. *Anthropology and Education Quarterly* 20:67-73.

LIVINGSTONE F. B.
1962 On the non-existence of human races. *Current Anthropology* 3:279-281.

MAYR E.
1963 *Animal Species and Evolution*. Cambridge, Mass: Harvard University Press.

MAYR E.
1969 *Principles of Systematic Zoology*. New York: McGraw-Hill Book Company.

MOLNAR S.
1998 *Human variation: Races, Types and Ethnic Groups*. 4th ed. Upper Saddle River: Prentice-Hall.

MONTAGU A.
1951 A consideration of the concept of race. *Cold Spring Harbor Symposia on Quantitative Biology* 15:315-36.

MONTAGU A. (ed.)
1965 *The Concept of Race*. New York: Free Press of Glencoe.

MONTAGU A.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

1965a "The concept of race," in *The Concept of Race.* Edited by A. Montagu, pp. 12-28. New York: Free Press of Glencoe.

MONTAGU A.

1972 *Statement on Race*: An Annotated Elaboration and Explanation of the Four Statements on Race Issued by UNESCO. 3rd ed. New York: Oxford University Press.

MONTAGU A.

1974 *Man's Most Dangerous Myth: The Fallacy of Race.* New York: Columbia University Press.

NEWMAN M. T.

1963 Geographic and microgeographic races. *Current Anthropology* 5:189-207.

OXFORD DICTIONARY OF BIOLOGY,

1996 London: Oxford University Press.

RELETHFORD J. H.

1995 Review of J. P. Rushton's *Race, Evolution, and Behaviour: A Life History Perspective. American Journal of Physical Anthropology* 98:91-94

SHIPMAN P.

1994 *The Evolution of Racism: Human Differences and the Use and Abuse of Science.* New York: Simon and Schuster.

SIRIANNI J. E.

1993 Proceedings of the sixty-second meeting of the American Association of Physical Anthropologists. *American Journal of Physical Anthropology* 92:549-560.

ŠTRKALJ G.

1997 Letter to the editor. *Society* 35:6.

ŠTRKALJ G.

in print. Inventing races: Robert Broom's research on the Khoisan. *Annals of the Transvaal Museum.*

TOBIAS P. V.

1985 "Race," in *The Social Science Encyclopedia.* Edited by A. Kuper and J. Kuper, pp. 678-682. London: Routledge and Kegan Paul.

TOBIAS P. V.

1997 Darwin, race and the AAPA 1997 Charles R. Darwin lifetime achievement award. *American Journal of Physical Anthropology* 104:553-555.

WILSON E. O. AND BROWN W. L.

1953 The subspecies concept and its taxonomic application. *Systematic Zoology* 2:97-111.

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BOOK REVIEW ARTICLE

Races do Not Exist – So Study Them!

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Review of *Genes, Peoples, and Languages*, by Luigi Luca Cavalli-Sforza [Translated by Mark Seielstad] (2000), New York: North Point Press Pp.228, $ 24.00, ISBN 0-86547-529-6.

The dean of population genetics, Luigi Luca Cavalli-Sforza, has given us a nontechnical overview of what he knows, or thinks he knows, (or wants you to think you know) about genetics and human evolution. LLC-S (born 1922) is presently a Professor Emeritus of Genetics at Stanford University. The contents of this little book (6 chapters in 228 pages) began as a series of public lectures first delivered in 1981. Over the years since then the material has been rewritten and up-dated numerous times. Previously published in French and Italian, those two versions were melded and revised into this English translation by graduate student Mark Seielstad.

Mr. Seielstad has done an excellent job in producing an English version that is smooth flowing, a pleasure to read, and by-and-large faithful to LLC-S's foibles. The well informed specialist will be fascinated by a wealth of personal historical anecdotes, while the non-specialist will be variously informed and misinformed concerning a lot of material that bears on an understanding of human evolution and genetic diversity.

The book is strongest in its explanation of techniques and results from studies of genetic diversity and language diversity. It is weakest, actually providing much disinformation, in its treatment of behavioral development and racial differences. A bit frustrating is that the book has no references or footnotes, although a bibliography is offered at the end.

The book starts right out with what has become Luigi's

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trademark: Deny the existence of that which he studies. For decades LLC-S has been an outspoken advocate of the "races do not exist" mantra while he goes about studying the genetic differences among them.

It has been suggested repeatedly that the denial of race is a strategic ploy to allow him to proceed with his favorite research. There may be some truth to this, in that it is well documented that he has had troubles both from funding agencies and from spokespersons for "indigenous peoples" whose genetics he wished to sample (Kahn, 1994). I know from personal experience that many world class researchers in human genetics are running scared of the anti-racial thought police. When I mentioned race differences in a presidential address to the Behavior Genetics Association (Whitney, 1995), some of my colleagues urged me to resign for the good of the science – by bringing up race they feared that I had placed all funding for behavior genetic research in jeopardy. In a similar vein, a widely used current textbook of behavior genetics claims that Jensen's 1969 writing about race and intelligence had constituted a grave threat to the entire field of investigation (Plomin, *et. al.*, 1997). So, LLC-S can remain one of the angels, have access to native groups, and be funded, by denying that races exist—he studies genetics of populations, not races.

But there seems to be more to his denial than a simple ploy to maintain funding. His discussion completely confounds race as a scientific concept, with racism as a social phenomenon. He says, "It seems wise to me, therefore, to abandon any attempt at racial classification along the traditional lines."(p.29) This after lamenting a number of factors such as supremacism, scapegoating, oversimplification, superficiality, and confusion of biological and cultural heredity.

Supremacism is the tendency for each population to believe that it is the best in the world. He notes that a succinct definition of racism is the belief that one race (usually but not always one's own) is biologically – genetically – advantaged over all others. Scapegoating is the blaming of someone else, often an identifiable group, for the trials and tribulations of existence. Poverty and injustice, feelings of powerlessness, envy, can be dealt with by blaming another group. So, let's not identify groups.

In complaining about oversimplification, LLC-S invokes the

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straw man of racial purity. Granted some pre-genetic biologists, and some politicians, have invoked the notion of pure races, defined as groups within which there is no genetic variation. However, it has been well known for a long time that all naturally existing groups of sexually reproducing creatures harbor much genetic diversity. German Shepherds are reliably different from Irish Setters, even though both breeds have lots of genetic variation within them. "Pure breeds" of dogs and "racially pure" stocks of humans can exist in a real world where at the same time each group has lots of genetic variation. LLC-S would acknowledge that any reasonably normal child could unerringly sort out the native inhabitants of Sweden (prior to recent immigration) from the native inhabitants of Nigeria or Japan. So, given that reliable race (oops, population) differences do exist, the fallback position is to invoke superficiality.

Superficiality is the "race differences are only skin deep" argument. LLC-S mentions obvious appearance traits such as skin color, eye shape, hair type, body and facial form, and acknowledges that it is "fairly easy to recognize a European, an African, and an Asian"(p.9-10). These traits are evolved adaptations: "One can say that each ethnic group has been genetically engineered under the influence of the environments where it settled." (p.10). Examples include the white skin color of Europeans, handy in a cloudy overcast region to allow the sun's weak ultraviolet radiation to penetrate and manufacture vitamin D. However, a handicap in a sunny climate where too much penetration of radiation contributes to skin cancer. In regions hot and humid it helps to be short because then there is greater surface area for the evaporation of sweat compared to the body's volume. Smaller bodies also use less energy and thus produce less heat. "Frizzy hair" allows sweat to remain on the scalp longer which leads to greater cooling. Pygmies are an extreme example of the generality that tropical forest people tend to be short. "The face and body of the Mongols, on the other hand, result from adaptations to the bitter cold of Siberia."(p.10).

After this auspicious beginning considering racial adaptations, LLC-S falls off the tracks with the allegation that "Adaptations to climate primarily affect surface characteristics."(p.12). This completely unsupported, but common claim, arose from the obvious fact that it is easier to study surface traits than it is to measure traits such as psychological tendencies and complex physiology. Historically the

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surface traits were investigated first, before we knew much about more difficult to study variables. The lack of knowledge of more cryptic traits, in the hands of ideologues, has led to the silly *non sequitur* that if races are very different from one another in many surface traits, then they must be the same for traits that are not on the surface. Rather than repeating politically correct nonsense, LLC-S should read Rushton (1995).

Another problem with race concepts is "that most people do not distinguish between biological and cultural heredity" (p.9). LLC-S notes that the "U.S. census recognizes Whites, Blacks (African Americans), Native Americans, Asians, and Hispanics. This last category has almost no biological meaning." (p.28). "Hispanics", a linguistic category includes, among others, Ashkenazi Jews from Cuba, Blacks from Puerto Rico, mixed race Mestizos from Mexico, Orientals from Peru, and Amerindians from Guatemala. Obviously an absurd grouping from the point of view of biological races.

[However, although not meaningful biological categories, linguistic/cultural classes can be profoundly important. For example, if "Hispanic" or "Latino" immigrants tend to come from "Banana Republics" where graft and corruption is a way of life, then allowing them to immigrate can be very problematic. They wish to come to the U.S. and benefit from our cultural system. But if our version of Anglo-Saxon rule-of-law is alien to their culture, and they wish to maintain their culture, then we have a grave problem: Essentially, having ruined their country, now they want to come and ruin ours. Cultural heredity can have profound consequences and is not always easy to change.]

LLC-S emphasizes that biological heredity (meaning genetically transmitted traits) is very stable over time, while cultural (socially determined or learned traits) can in theory change very rapidly. This distinction is at the root of much of modern liberalism's (and communist) wishful-thinking denial of the existence of inherited differences.

It is difficult to maintain political correctness and scientific integrity. To his credit, LLC-S asks, "What is a Race, Then?" and answers "A race is a group of individuals that we can recognize as biologically different from others."(p.25). Also, if "genetic differences were found to be genuinely important and could support the sense of superiority that one people can have over another, then racism is

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justified – at least formally."(p.9). In addition to Rushton, LLC-S should also read Levin's *Why Race Matters* (1997).

LLC-S is at his best in describing what he does for a living, study genetic variation among groups of people. It was in 1951 that he first started thinking about reconstructing phylogenetic trees, from distributions of genes, in order to understand human evolution. By 1962 he was teamed up with Anthony Edwards and they were working on trying to fit trees to real genetic data for the first time. In so doing Edwards actually reinvented principal components analysis. Various statistical methods, such as trees, components analysis, multidimensional scaling, are complimentary. Since different methods go at the data differently, have different simplifying assumptions and so-forth, if their results converge on the same picture, it is encouraging that the investigators may be on the right track.

These statistical procedures are quite complex and require lots of computations. LLC-S mentions that principle components analysis had been invented in the 1930s, but before computers it was almost never used because of the "staggering amount of arithmetical work it requires." Starting with a "data matrix" consisting of the frequencies of various forms of many genes, observed in many populations, one calculated "eigenvectors" and "eginvalues" on the way to concise interpretation with minimal loss of information.

LLC-S points out that it is difficult to explain the methods to non-mathematicians, but like other outstanding people who really understand their material, he has a knack for easy-to-understand intuitive explanation. For example, at the heart of all the math is the goal of determining genetic distances between populations. So what is a genetic distance?

Consider an example using the well-known gene with alleles [different forms] A,B,O, of major blood groups. For allele "A", the frequency [percent of copies of the gene that are A] is .25 [or 25%] among European Englishmen, and about .02 [or 2%] among Native Americans. So, estimated from the distribution of this one allele, the genetic distance between English and Amerinds is the difference of the allele frequencies: [.25-.02= .23].

However, for the "B" allele, English have .08, while Amerinds are .003. So the genetic distance estimated from the distribution of allele "B" is [.08-.003] = .077. Interestingly, the ratios for these two cases are quite similar; .92 and .96, respectively. So what is the

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overall, or average, genetic distance between English and Amerind, 23 or 7.7, or .9-something or? The complex statistics use values for many alleles of many genes from many populations to derive overall best estimates of genetic distances.

For the monumental work *The History and Geography of Human Genes* (1994) LLC-S and colleagues collected data for about 100,000 gene frequencies from approximately 2,000 populations distributed around the world. That work used gene products, protein polymorphisms [blood antigens, enzymes, structural proteins, etc.] rather than direct analysis of the DNA from the genes themselves. Newer techniques will allow similar surveys to be conducted with the genes themselves.

To understand human evolution LLC-S uses convergent information from a variety of sources in addition to gene distributions. Archeology and the dating of fossil remains form an important part of reconstructing the past, as does linguistics. Today there are over 5,000 spoken languages. Some of them are very widespread such as English, while only a hundred or fewer people speak others. Languages have a history of relationship, much as do biological populations. For example the romance languages –Italian, French, Spanish, Romanian, derive from a common source, Latin. The Germanic language family includes Dutch, English, Flemish, German, Swedish. Data on languages from around the world can be subjected to statistical analysis analogous to that used with genes, and the results compared. Turns out that there are important similarities between the evolution of languages and genes. Each can be used to aid in understanding of the other.

The fascinating results of the research, most of it reported in *The History and Geography of Human Genes* is here summarized, and has been extensively reviewed previously (Miller, 1994). One interesting example is the robust finding that sub-Saharan Black Africans are substantially most distant genetically from all other humans. This new genetic finding is entirely consistent with Charles Darwin's observation that the differences between African Blacks and Europeans were so large that any taxonomist would consider them separate species, except for their willingness to hybridize (Whitney, 1999).

In this otherwise excellent summary of the work of an important scientist it is saddening, indeed embarrassing, to encounter a bed of

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disinformation. The discussion of intelligence in relation to genes and race is not only wrong, it is 180 degrees opposite the actual findings in that branch of science. We are told that "It is thanks to the American psychologist Leon Kamin that Burt's fraud was discovered." (p.189). In fact the posthumous attack on Sir Cyril Burt's legacy, spearheaded by the Marxist Professor Kamin, has been largely debunked. First, the interpretation of the historical record has been called into question. Second, new and totally independent research completely supports Burt's findings of a heritability of .7 or larger, for intelligence ["heritability" is the percent of the variation in a population that is attributable to genetic differences among the members of the population].

It is stated that "The study of adopted children was decisive in showing that cultural transmission exerts a strong influence on the determination of IQ." (p. 189). Actually research has found the surprising result that there is *NO evidence of a family effect* ["cultural transmission"] on the adult IQ of adopted children (Whitney, 1996). For black babies adopted into middle class bright, white, families, one of the leading researchers in the area has written:

> The test performance of the Black/Black adoptees was not different from that of ordinary Black children reared by their own families in the same area of the country. My colleagues and I reported the data accurately and as fully as possible, and then tried to make the results palatable to environmentally committed colleagues. In retrospect, this was a mistake." (Scarr, 1998, p.230).

It is stated that "Theories about the role IQ plays in social stratification have also been disproved. Some researchers have claimed, without real evidence, that the difference in IQ observed between high and low social classes was genetic," (p.189). He has it exactly backwards again. Here again is a statement from one of the leading researchers:

> "Our own adoption studies found that children adopted in infancy into working class families achieved IQ levels as high as adoptees reared in privileged professional families, whereas biological offspring of such families differed by 10 IQ points, on average. Clearly, genes were the major cause of social class differences in IQ" (Scarr, 1998, p.229).

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Similarly, extensive research has investigated the relation between IQ and social/economic stratification. Results show that a major reason for the stratification is the IQ of the individual, more so than the social strata into which they are born. With both upward and downward social mobility, on average higher IQ persons tend to be upwardly mobile while lower IQ persons tend to be downwardly mobile (Murray, 1998). Although there is a lot of variation within each social class, the relationship is largely because low IQ tends to cause poverty. What holds for individuals also holds, on average, for groups of individuals such as races.

Why corrupt science on this particular topic? Could it be a commitment to egalitarian liberalism or classical Marxist-Leninism? There is much evidence that twentieth century science has been severely warped by such ideological stances (Hunt, 1999; Pearson, 1997). Cavalli-Sforza writes that with regard to the low IQ of Black Americans, "the majority is likely to be still convinced that it is the result of a real genetic difference ... that cannot be reversed in a short time" (p.189). Indeed, perhaps after a century of intensive brain washing the majority can still correctly interpret the real world. And Cavalli-Sforza had already told us that "***If these genetic differences were found to be genuinely important ... then racism is justified***" (p.9).

References

Cavalli-Sforza, L. L., P. Menozzi, & A. Piazza.
1994 *The History and Geography of Human Genes.* Princeton NJ: Princeton University Press.

Hunt, M.
1999 *The New Know-Nothings: The political foes of the scientific study of human nature.* New Brunswick NJ: Transaction.

Kahn, P.
1994 Genetic diversity project tries again. *Science, 266,* 720-722.

Levin, M.
1997 *Why Race Matters.* Westport CN: Praeger.

Miller, E. M.
1994 Tracing the genetic history of modern man: a review. *The Mankind*

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Quarterly, 35, 71-108.

Murray, C.
1998 *Income Inequality and IQ*. Washington D.C.: American Enterprise Press.

Pearson, R.
1997 *Race, Intelligence and Bias in Academe, 2nd Ed.* Washington DC: Scott-Townsend.

Ploman, R., J. C. DeFries, G. E. McClearn, & M. Rutter.
1997 *Behavioral Genetics, 3rd Ed.,* New York: Freeman.

Rushton, J. P.
1995 *Race, Evolution, and Behavior.* New Brunswick NJ: Transaction.

Scarr, S.,
1998 On Arthur Jensen's integrity. *Intelligence*, 26, 227-232.

Whitney, G.
1995 Ideology and censorship in behavior genetics. *The Mankind Quarterly, 35*, 327-342.

Whitney, G.
1996 Professor Shockley's experiment. *The Mankind Quarterly, 37,* 41-60.

Whitney, G.
1999 On the races of man. *The Mankind Quarterly, 39,* 319-335.

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BOOK REVIEW

Hormones, Gender and the Aging Brain
Editor Mary F. Morrison
Cambridge University Press
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This work comprises sixteen papers written by qualified academic authorities and edited by a Professor of Psychiatry and internal Medicine at the University of Pennsylvania School of Medicine.

The significance of hormone action in psychiatry has long been studied, but only very recently has this research been extended to include the psychiatric effects of hormones on the aging process. This is the first clinical reference to address the hormonal basis of mental disorders in older people. Hormones influence a wide range of states and conditions, from pain tolerance and anorexia to attention, mood, immunity, cardiovascular and cognitive function, schizophrenia and Alzheimer's disease.

These papers, written by an eminent team of psychiatrists, psychologists, geriatricians and neuropharmacologists, bring together established information about recent findings, and provides a useful overview of the basic science of neurosteroids, sex difference and the various roles that cortisol, thyroid hormone, and the sex steroids estrogen, progesterone, dehydroepiandrosterone and testosterone, play in pain sensitivity and common mental disorders. In addition, it treats with psychoneuroimmunology in relation to age sex differences and the role of hormones in psychotropic drug metabolism in the elderly.

Clinicians and researchers alike will value this comprehensive review of a complex and sometimes controversial area of psychiatry. It contains a wealth of recent data and an extremely useful list of references on all subjects covered.

H. P. Penrith

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Jakob Grimm

Translated by Vivian Bird

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